

PRINTRONIX

Printronix 300 Applications Manual



PRINTRONIX

Printronix 300 Applications Manual

**Part No.
102487**

NOVEMBER 1977

PROPRIETARY NOTICE

All information contained in this Maintenance Manual is disclosed for normal use and may not be duplicated in part or full without prior written approval of Printronix, Inc. The purpose of this manual is to provide the user with sufficient information to efficiently maintain the equipment supplied. Use of this document for any other purpose is prohibited.

PRINTRONIX

17421 DERIAN AVE., IRVINE, CALIFORNIA 92714
(714) 549-8272 TWX 910-595-2535

INTRODUCTION

This manual contains interface information, procedures for communicating with the Printer, command and data codes, formats, and installation procedures for the Printronix 300 Printer; as well as summary descriptions of some Printer options and accessories including special interfaces.

For operating instructions, refer to the *Printer Operator's Manual* (P/N 102486). Information for maintaining and repairing the Printer is contained in the *Maintenance Manual* (P/N 101691) and the *Drawing Manual* (P/N 102496-001).

TABLE OF CONTENTS

	PAGE
GENERAL DESCRIPTION	PAGE
General	1
Specifications	3
COMMANDS AND FORMATS	
General	6
Form Feed	6
Carriage Return	6
Elongated Characters	6
Space	6
Delete	6
Underline	7
Plot Mode	7
Shift to Optional Character Set	7
Vertical Tab	7
Electronic VFU	9
INTERFACE	
General	10
Centronics Interface	10
Data products Interface	12
Transmitter/Receiver Circuits	13
OPERATING THE PRINTER	
General	14
Operating Panel	14
SITE PREPARATION	
General	16
Power	16
Cables	16
Preparing Table Top for the Printer	17
INSTALLING THE PRINTER	
General	18
Installing Printer on Pedestal	18
Installing Printer on Table	19
CONFIGURING THE PRINTER	
General	20
Jumpers	
Jumpers on Logic A Board	23
Jumpers on Logic B Board, Location 8K	23
Jumpers on Logic B Board, Other Locations	23
Terminating Resistors	25
Installing Character Memory PROMs	25
Coding Character Memory PROMs	25
Adapting Printer for Line Voltage	25
Adapting Printer for Line Frequency	30
OPTIONS	
General	31
Forms Length Selector	31
Mechanical VFU	32
Long Lines Interface	32
RS232 Interface	34
Block Character Printing	35
Exerciser	36

LIST OF ILLUSTRATIONS

Figure	Page
1 Typical Character Dot Pattern	1
2 Print Hammer Arrangement (Cross-Sectional View)	2
3 Effect of Carriage Return Code	6
4 Printing Dot Row in the Plot Mode	7
5 Typical Graph Printed in the Plot Mode	8
6 Example of Electronic VFU Program	9
7 Timing of Centronics Interface	10
8 Timing of Dataproducts Interface	12
9 Operator Panel	15
10 Static Eliminator	16
11 Preparing Printer Table	17
12 Bottom View of Printer on Pedestal	18
13 Installation of Paper Catcher	18
14 Grounding Paper Catcher	18
15 Access to Printed Circuit Board Assemblies	21
16 Jumpers in Location 8K, Logic A and Logic B PCBA's	23
17 Jumpers on the Logic B PCBA, Other Locations	23
18 Location of Character Memory PROMs	26
19 Hardware for Access to Transformer Tap Terminals	27
20 Wiring for 100V/110V/120V	27
21 Transformer Connections for 100V/110V/120V	28
22 Wiring for 200V/220V/240V	29
23 Transformer Connections for 200V/220V/240V	29
24 Label Locations	30
25 Forms Length Selector PCBA	31
26 Mechanical VFU	32
27 Jumpers on Mechanical VFU PCBA	33
28 Tape Configuration for Two-Channel Mechanical VFU	33
29 RS232 Interface Cabling	35
30 Typical Block Character Printing	36
31 Printer Exerciser (with Mini-Exerciser)	37

GENERAL DESCRIPTION

GENERAL

The Printronix 300 is a line matrix printer that operates at a speed of 300 lines per minute. A very simple, but unique mechanical design using few moving parts makes possible high-speed, precision performance in a relatively low-cost printer.

The Printronix 300 prints on single-part or multi-part forms on continuous fanfold, edge-perforated paper up to 16 inches wide. The printer produces high-quality copy on multi-part forms, labels, and other business forms known to be problems on some printers.

Excellent print quality is achieved by overlapping dots of uniform density (figure 1). An upper-case character is formed by a 9×7 dot matrix, with five overlapping dots in the horizontal plane on nine centers for accurate character rendition. The nature of the printing mechanism insures accurate dot placement throughout the life of the machine, without any adjustment.

A dot is impacted by electromagnetically releasing a leaf spring normally held under tension by a permanent magnet. Because there are very few

moving parts, the printer is inherently reliable. MTBF has been calculated to be greater than 3000 hours.

Printing is done by a bank of 44 leaf spring hammers (figure 2) positioned horizontally at every third character position. The hammers are mounted on a shuttle which sweeps the hammers across three character positions over a 0.3-inch movement. As the shuttle sweeps across, the hammers are activated at each position in the dot row at which a dot is required.

While the shuttle is slowed at the end of each movement, and then accelerated in the reverse direction, the paper feed moves the paper upwards one vertical dot row. The shuttle then sweeps across in the reverse direction again distributing dots in that row.

This process continues through a total of nine sweeps (for a lower-case character with tails) until a line of characters has been completed. Seven sweeps form an upper-case character. The paper is then advanced a distance equal to line separation and the process is repeated for the next line of print.

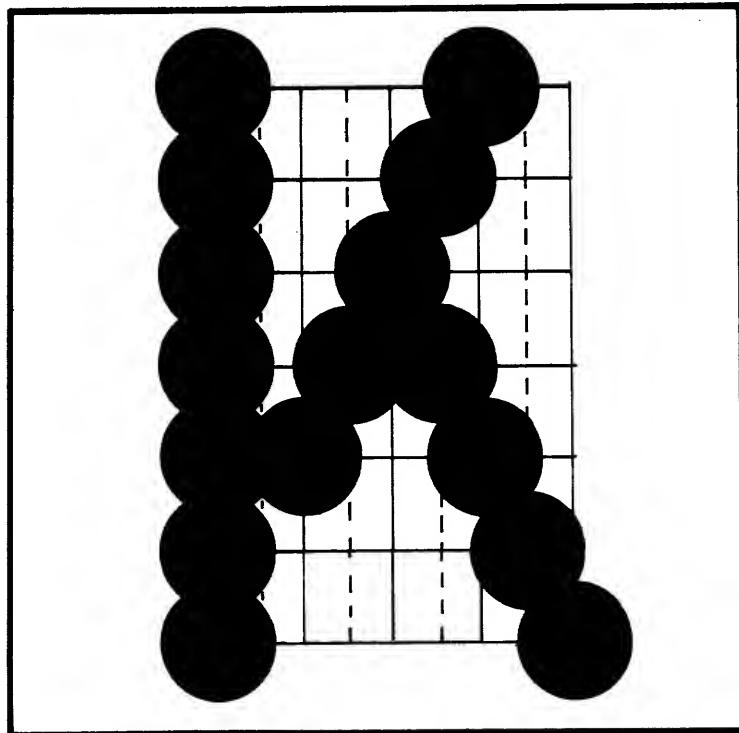


Figure 1. Typical Character Dot Pattern

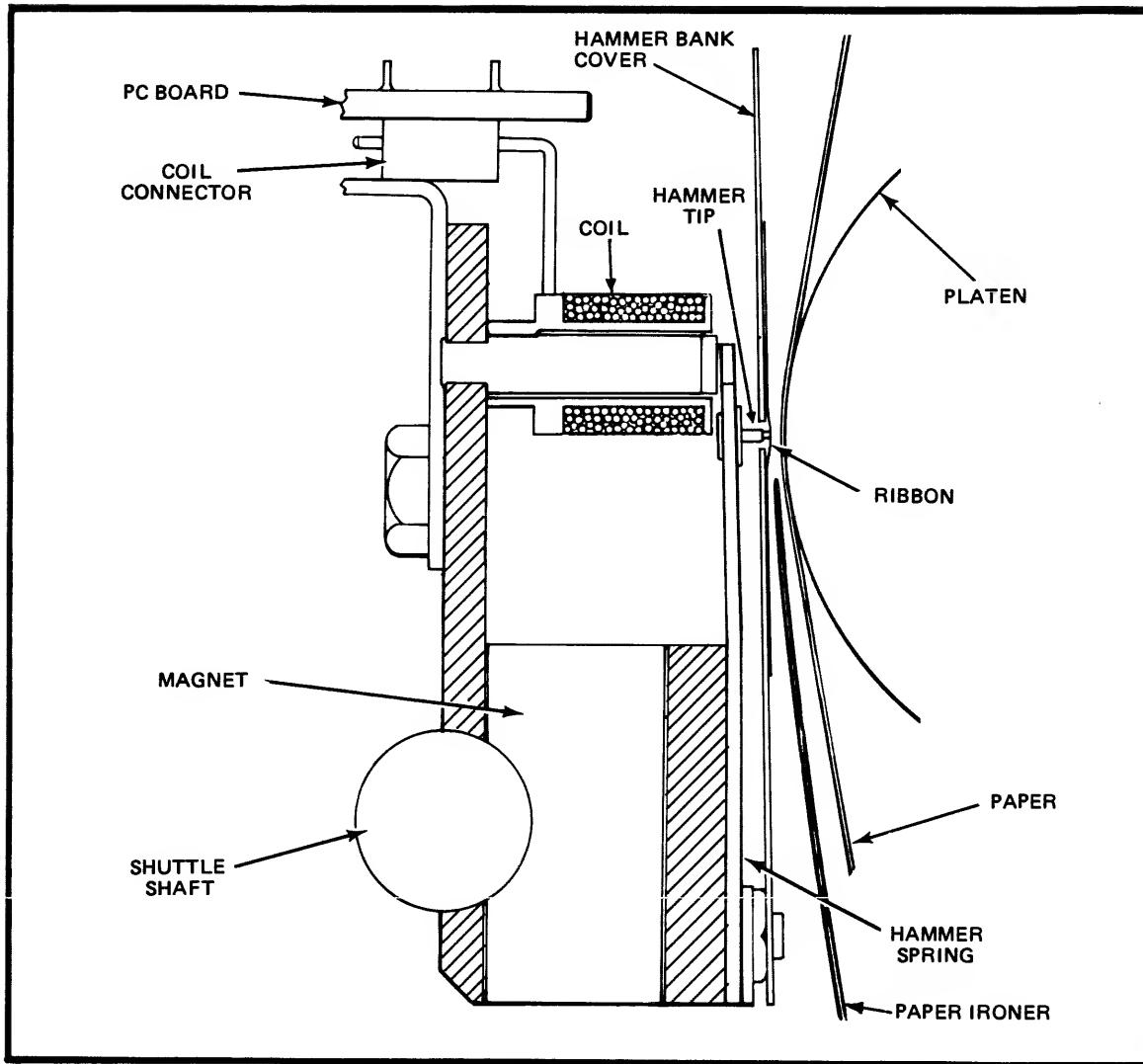


Figure 2 Print Hammer Arrangement (cross-sectional view)

Characters are printed in a line of up to 132 characters, with line spacing of six or eight characters per inch selected by the operator or by the program. The standard character set is 96-character ASCII (table 1). Character form is electronically determined by codes stored in PROM (Programmable Read-Only Memory) devices which are accessed by the received character codes. This characteristic permits configuring any "character" that can be made within the 9×9 matrix. The printer accommodates PROM devices to provide up to 160 printable characters.

Standard features permit printing double-height (elongated) characters, printing graphic plots, and underlining. The standard Printronix 300 also

includes an electronic VFU (vertical format unit) for composing forms of up to 132 lines.

Options available include EBCDIC, Katakana, Farsi, Arabic, Hebrew, Greek, Cyrillic, and other special character sets; an optical tape VFU, an RS-232 serial interface, long-lines interface, manual variable forms-length selection, Exerciser modules, and an unconfigured printed circuit board for special user-built interfaces.

The standard electrical interface is for TTL logic. The electrical and logic interface is compatible with both Dataproducts and Centronics printer products, with either type of interface accommodated by selecting the appropriate interface cable.

Table 1. 96-Character ASCII Set

Bits 7-5	000	001	010	011	100	101	110	111
Bits 4-1								
0000		1	space	0	@	P		* p
0001		2	!	1	A	Q	a	* q
0010		3	"	2	B	R	b	r
0011		4	#	3	C	S	c	s
0100		5	\$	4	D	T	d	t
0101	plot	6	%	5	E	U	e	u
0110	8 LPI	7	&	6	F	V	f	v
0111		8	,	7	G	W	* g	w
1000	elong char	9	(	8	H	X	h	x
1001		10	)	9	I	Y	i	* y
1010	line feed	11	*	:	J	Z	* j	z
1011	vert tab	12	+	;	K	[	k	{
1100	form feed	13	,	<	L	\	l	,
1101	carr rtn	14	-	=	M	]	m	}
1110	shift out	SL	.	>	N	^	n	~
1111	shift in	EL	/	?	O	—	o	del
ELECTRONIC VFU CHANNELS AND LOAD CODES (REFER TO JUMPERS)								
*DESCENDERS • UNASSIGNED CODES RESULT IN "NO OPERATION." • BIT 8 SELECTS OPTIONAL ALTERNATE 64-CHARACTER SET								

Principal elements of the printing mechanism are:

- a motor-driven cam coupled to a flywheel on which is mounted a magnetically sensed timing disk;
- the hammer bank with electromagnetically actuated leaf-spring print hammers. The cam moves the hammer bank in a shuttling motion.

- ink ribbon and paper-advance mechanisms.

There are no periodic field adjustments required for the print, paper, and ribbon-handling mechanisms. The Printronix 300 is designed to give many hours of service with no attention other than cleaning, paper loading, and ribbon changing. For more maintenance information, refer to the Printronix 300 *Maintenance Manual* (Part No. 101691-001).

SPECIFICATIONS

Printer Mechanism

Print Rate

300 LPM. 170 LPM for double-height characters, 240 LPM when underlining or printing lower-case characters with descenders (tails below the line).

Matrix

9 × 7 dot matrix (upper-case). Horizontal plane has five overlapping dots on nine centers. Vertical plane has seven overlapping dots (nine with descenders). Dot spacing is 0.0167 in. horizontal, 0.01389 in. vertical.

Character Format

132 characters per line, 10 characters per inch horizontal, six or eight characters per inch vertical (10 optional).

Character Set

Standard 96-character ASCII set. Provisions for 64-character extended set. Up to 160 different characters may be printed using additional programmable read-only memory (PROM) devices.

Character Registration	0.005 in. horizontal or vertical
Special Features	Double-height characters, plot mode, underlined characters, 6 or 8 LPI, electronic VFU.
Plot Mode	Density 60 dots per inch horizontal, 72 dots per inch vertical. Rate 16 $\frac{2}{3}$ inches per minute.
Options	Full-width characters (12 \times 9 matrix), EBCDIC codes, special character sets.
Ribbon Transport	
Ribbon	Nylon fabric, 1 in. wide, 60 yards long.
Transport	Dc servo. Electrical end-of-ribbon sensing with automatic reversal.
Paper Transport	
Paper Type	Edge-punched, fanfolded, up to 16 inches wide, single-part to 6-part forms. Single-part paper weight 15 to 100 pounds. Multi-part thickness to 0.025 inch max. For some paper colors it may be necessary to disable the paper motion detector (remove jumper W6 on Logic A PCBA).
Drive	Horizontally adjustable tractors with 8-pin engagement. Stepper motor.
Speed	33 msec per 1/6th-inch step, 25 msec per 1/8-inch step. Slew at 8 inches per second.
Forms Control	11-inch, with 1/2-inch to 1-inch perforation skip-over. Electronic VFU standard.
Features	Paper-out detection, paper-motion detector, static eliminator.
Options	Forms Length Select Switch, 2- or 8-channel mechanical VFU.
Operator Controls and Indicators	
Operator Panel	Pushbuttons TOP OF FORM (indicates VFU loaded), ON LINE/OFF LINE (indicates ON LINE), 6 LPI/8LPI (indicates 8LPI), CHECK (indicates fault), PAPER ADVANCE, POWER indicator. Power switch on printer base.
Internal Controls	Form Thickness Adjustment, Horizontal Vernier, Vertical Form Positioning.
Interface	
Input	Parallel-bit ASCII code, TTL logic levels.
Compatibility	Standard printer products of Dataproducts Corp. and Centronics.
Buffer Size	One line (132 characters maximum).
Data Input Rate	500 kHz maximum.
Options	RS-232 buffered serial interface, long-lines interface.
Power Requirements	
AC line voltage	100, 110, 120, 220, or 240 V ac ($\pm 10\%$, -15%), 50 Hz or 60 Hz, single-phase. Voltage selected by transformer tap. (Change pulley for frequency change.)
Power Consumption	200 watts standby, 450 watts nominal, 800 watts maximum.
Environment	
Temperature	+10°C to +38°C operating, -40°C to +65°C storage.
Thermal Shock	11°C per hour.

Humidity (without condensation)	10% to 90% operating, 5% to 95% storage. Static eliminator permits reliable operation at very low humidity.
Shock and Vibration	Withstands shock and vibration encountered during normal installation, maintenance, and shipping in accordance with Printronix procedures. Shipping package conforms to National Safe Transit Committee Pre-shipment Test Procedures.
Acoustic Noise	Generated noise is less than 65 dbA when measured at a distance of three feet from front of printer while printing an 80-character line on single-part paper, printing a sliding 64-character pattern.
Static Discharge	Will withstand non-destructive static discharge of up to 20,000 volts and recoverable discharge of up to 15,000 volts.
Regulatory Body Compliance	Printer is U.L. approved and meets CSA and VDE EMI requirements. Internal line filter is standard.

Physical Characteristics

Dimensions	16.5 in. high, 30 in. wide, 24.25 in. deep
Weight	185 pounds.
Color	Standard color off-white with black base.
Features	Quietized cabinet, pedestal with basket and guide.

COMMANDS AND FORMATS

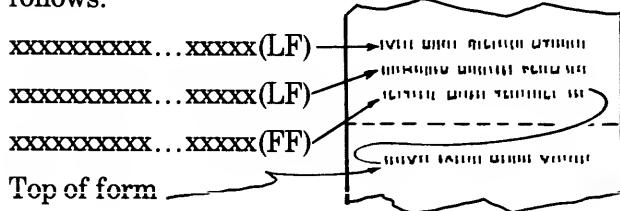
GENERAL

A typical transmission contains groups of from zero to 132 characters (including alphanumerics, symbols, and space or control codes) with each group followed by a LF (Line Feed) code. The LF code (012_s) causes the contents of the printer buffer to be printed, and the paper then advanced to the next print line.

Coding for the standard ASCII character set is shown in table 1. The following paragraphs describe the function of each of the codes used to control the printer.

FORM FEED (FF, 014_s)

The last line to be printed in a form is ended by a Form Feed code. This code causes the printer to print the contents of the printer buffer and then advance the paper to the top of the next form, as follows:



NOTE

If electronic or mechanical VFU is loaded, top-of-form is controlled by location of channel 1. If VFU is not loaded, the printer assumes an 11-inch (66-line) form.

CARRIAGE RETURN (CR, 015_s)

A line of data followed by a Carriage Return code is not printed. However, characters presently stored in the printer buffer may be individually deleted, overprinted, or underlined in accordance with instructions in the following line (or lines) of received data. For example, see figure 3.

ELONGATED CHARACTER (010_s)

An Elongate code may be transmitted preceding the LF or FF code ending a line, to cause all characters in the line to be printed in their elongated form. The Elongate code may appear anywhere in the line and must appear in any line that is to be printed in elongated characters. Elongated characters are printed at either 3 LPI or 4 LPI, depending on the state of the 8 LPI control (on operator's panel).

a. for underlining

- last message: THE PRINTRONIX 300(CR) (stored)
- 2nd message: ssss _____ (LF) (underline)
- Print: THE PRINTRONIX 300

b. to add characters

- 1st message: INVOICE NO. DATE(CR) (stored)
- 2nd message: ssssssssssss 3167ssssss 5/17/77 (addition)
- Print: INVOICE NO. 3167 DATE 5/17/77

c. to add, delete, and underline

- 1st message: INVOICE NO. DATE(CR) (stored)
- 2nd message: ssssssssssss 3167(CR) (addition)
- 3rd message: ssssssssssss sdddd(LF) (underline, delete)
- PRINT: INVOICE NO. 3167

s = space = 0408 d = delete = 1778
— = underline = 1378 LF = line feed = 0128
CR = carriage return = 0158

Figure 3. Effect of Carriage Return Code

SPACE (040_s)

The Space code causes the printer to leave a blank in the character position represented by the code. The Space code must be used to represent *each* character space in which no character is to be printed. However, Space codes are *not* required to fill out the buffer. Following a Carriage Return code, Space codes do not modify the buffer contents but act only as "skip" characters.

DELETE (177_s)

Delete acts much like a Space code, except following a Carriage Return code. In that case, Delete causes the printer to print blanks for those characters previously stored in the buffer (see figure 3). That is, each character overwritten by a Delete code will be deleted.

UNDERLINE (137_s)

Underline causes the printer to underline characters at positions marked by this code. Underline may be used to underline characters in a line, stored in the printer buffer, that was terminated by a Carriage Return code. Note that the print speed is reduced to 240 LPM for any line in which Underline is used.

If a special character set is used which utilizes the code 137_s, disable Underline by connecting jumper W3 on the Logic A PCBA (refer to *Jumpers*).

PLOT MODE (005_s)

In the Plot mode characters are not decoded and printed, but graphs, plots, and figures may be constructed of discrete printed dots. Bits on data lines are interpreted as contiguous dot positions in a dot row. A complete dot row contains 132 six-dot positions, for a total of 792 dot positions (dot columns). Figure 4 shows how a dot row is printed.

Similarly, there are 792 dot rows (11 inches x 72 dots/inch). Adjacent dot rows and columns overlap 0.004 inch, to provide the effect of solid horizontal or vertical lines, or a solid-black area.

Because the user can address any individual dot position for printing, he can print, in the plot mode, bar codes, bar graphs, half-tone pictures, large block characters, schematics, and complex curves (figure 5).

Plot mode operation is selected by a software command. Therefore, it's easy to print both graphics and text on the same page (but not intermixed on the same line). Characters may also be pro-

grammed and printed as part of the plotted material.

The printer will produce an original and up to five copies. Because the printer prints on ordinary paper, operating cost is typically one-fifth that for an electrostatic printer.

Detailed information on using plot mode is contained in Application Note No. 102370 *Using the Plot Mode*.

SHIFT TO OPTIONAL CHARACTER SET

There are two ways to shift in and out of the ASCII code set in order to select an optional set of characters (97 through 160). Unless the data bit 8 input is strapped false (refer to *Installation*), data line 8 may be used to select the optional character set. Bit 8 high selects the optional set, and bit 8 low selects the ASCII set.

If the data line 8 is not available for this function, control characters may be programmed to serve the shift function. Shift Out (016_s) causes subsequent characters to be selected from the optional set, and Shift In (017_s) causes subsequent characters to be selected from the ASCII set. If a line is to begin with characters from the optional set, a Shift Out code must precede the first character code.

A Shift In code is automatically generated at the end of every line.

VERTICAL TAB (013_s)

The Vertical Tab command permits programmed paper advance without using the VFU Control line (if Electronic or Mechanical VFU is loaded). Refer to *Electronic VFU*.

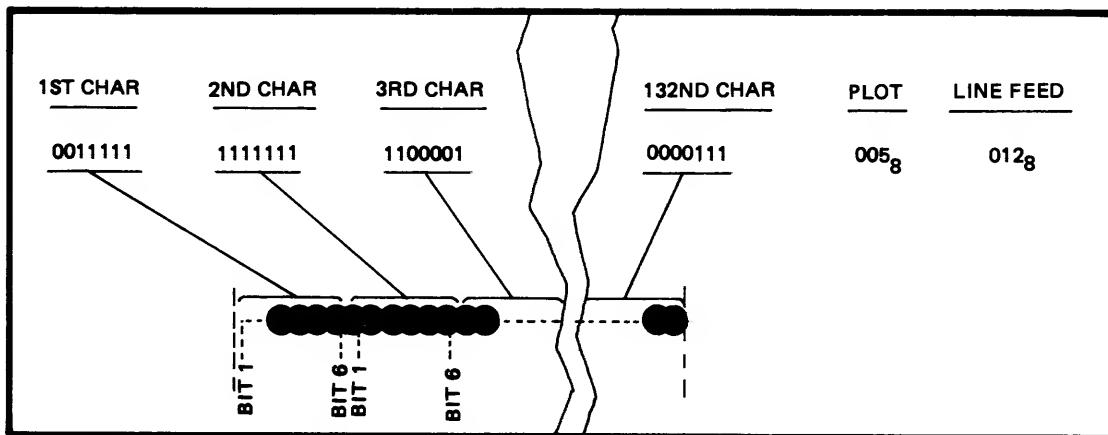


Figure 4. Printing Dot Row in the Plot Mode

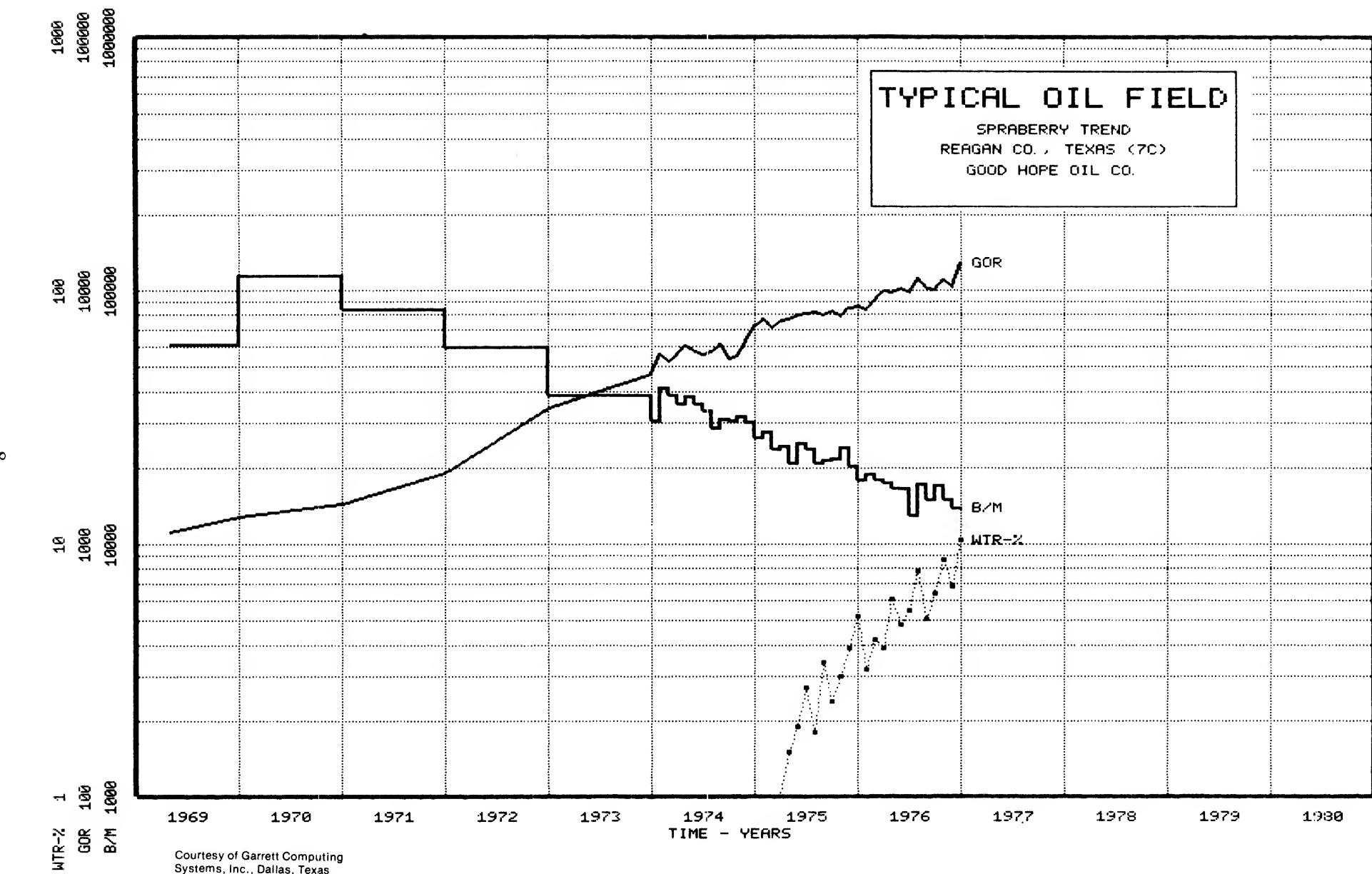


Figure 5. Typical Graph Printed in Plot Mode

ELECTRONIC VFU

The Electronic Vertical Format Unit (EVFU) — a standard feature of the Printronix 300 — is a reliable, software-operated vertical formatter. The EVFU is loaded and operated entirely by software, without operator intervention — a significant advance in reliability, convenience, and performance.

The EVFU accommodates up to 14 VFU channels, permits variable form lengths up to 22 inches, sets vertical tab stops, and controls slewing within the form.

The computer program causes the EVFU semiconductor memory to be automatically loaded through the data lines. Subsequent channel codes cause paper to advance in steps that define the vertical format of the form as it is printed.

The EVFU is instantly reloaded for a different form. Paper is simply advanced to the top of the next form, and the new form is printed automatically. No shut-down, no paper tapes, and no lost time.

The EVFU may be used in three different ways, as follows:

- To simply establish different form lengths; or
- using Channel 12 as a vertical tab stop to slew within the form; or
- using the full multi-channel capability of the EVFU.

For detailed information for using the EVFU, refer to Application Note No. 102374 *Using the Electronic VFU*. Figure 6 shows a typical EVFU program.

Load Program		Line of Form	Run Program	
Function	Code		Data and Format Code	Comment
STL	036			
Ch 1	020	1	(022 ₈)	slew to channel 3
2	021	2		
2	021	3		
2	021	4		
2	021	5		
3	022	6		
2	021	7		
2	021	8		
2	021	9		
2	021	10		
2	021	11		
4	023	12		
2	021	13		
2	021	14		
2	021	15		
5	024	16		
2	021	17		
2	021	18		
2	021	19		
2	021	20		
2	021	21		
2	021	22		
2	021	23		
2	021	24		
ELD	037			

Figure 6. Example using Electronic VFU in Multi-Channel Application

INTERFACE

GENERAL

This section describes the electrical and logic interface between the printer and the user's controller.

There are two standard interfaces; one compatible with controllers designed to operate with Centronics printers, and the other compatible with controllers serving printer products of Data-products Corp.

The printer is adapted for either interface by using the appropriate interface cable, with no logic changes. Refer to cabling information in *Installation*.

Signals to and from the printer are sent over twisted-pair or flat cables with a maximum length of 40 feet. (An optional long-lines interface permits communication over lines as long as 500 feet.) Standard high-true levels are: False = 0.0V to 0.8V; True = 2.0V to 5.5V. Low-true logic interfacing is also accommodated.

To minimize electrical noise, shield the interface cable and ground the shield at both ends.

Receivers are normally furnished with 1K-ohm termination resistors. The shipping kit includes a 220-ohm resistor pack, and a 330-ohm resistor pack, which may be installed as the application requires (refer to *Terminating Resistors*).

CENTRONICS INTERFACE

Certain jumpers must be installed on the Logic A PCBA in order to operate with a Centronics-compatible interface. Install jumpers W4 and W5 (and W2, if the line is to be terminated only by a Carriage Return). Refer to *Jumpers*.

The Centronics-compatible interface permits data transfer at rates up to 150,000 characters per second. Figure 7 shows timing of control signals exchanged in transferring a data character.

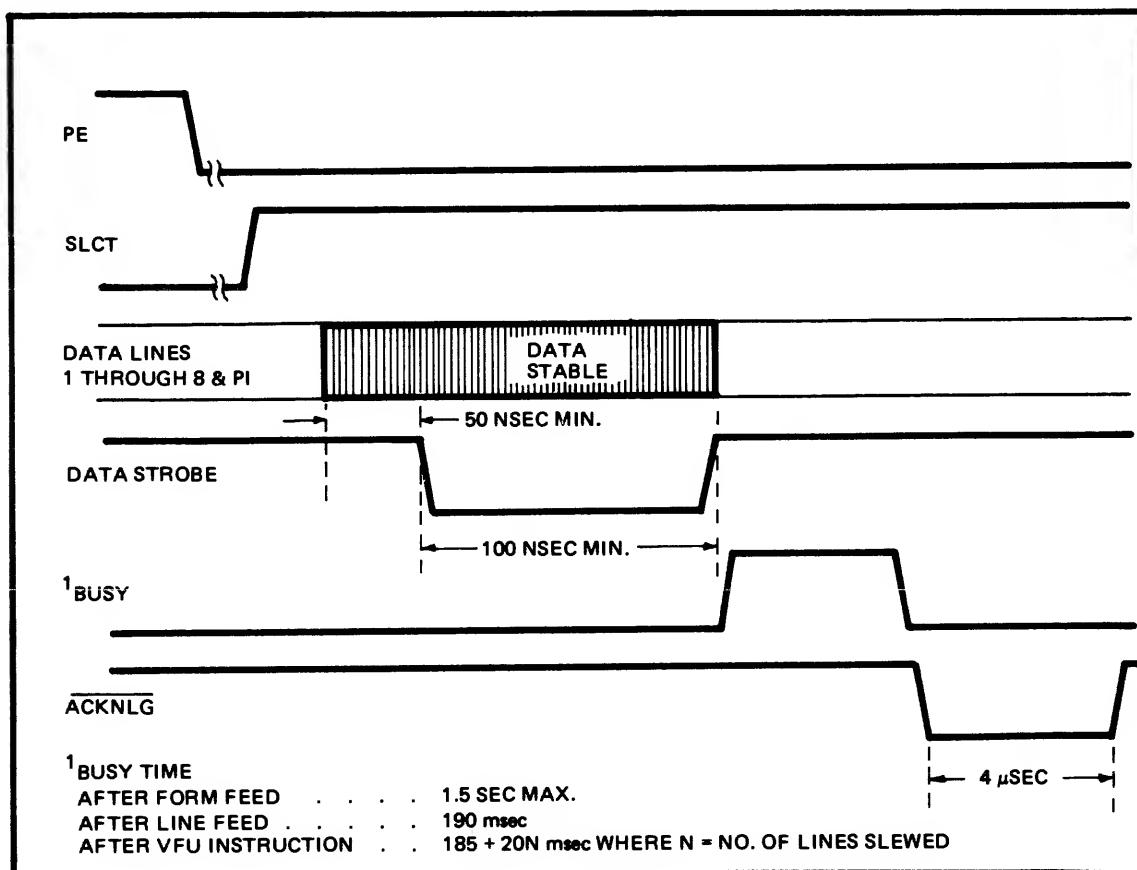


Figure 7. Timing of Centronics Interface

Table 2 lists the different lines that link the printer to the controller, and describes the func-

tion of each and its pin assignment on the interface connector at the printer.

Table 2. Centronics Interface Line Functions

Signal	Description	Connector Pin
Data Strobe	Sent by user system to cause printer to accept information on data lines. Data lines must stabilize for at least 50 nsec before Data Strobe is sent. Data Strobe must persist for at least 100 nsec.	1 (return 19)
Busy	Sent by printer to indicate that printing or paper feed operation is in progress.	11 (return 29)
ACKNLG	Sent by printer to indicate that the next character may be sent.	10 (return 28)
Data Bit 1 Data Bit 2 Data Bit 3 Data Bit 4 Data Bit 5 Data Bit 6 Data Bit 7 Data Bit 8	<p>Sent by user system</p> <p>Bit 8 controls optional character set. Refer to <i>Commands and Formats</i>.</p>	2 (return 20) 3 (return 21) 4 (return 22) 5 (return 23) 6 (return 24) 7 (return 25) 8 (return 26) 9 (return 27)
VFU Control (PI)	Optional control from user system. Used for VFU control. Strobe timing is same as for data lines.	15 (return 14)
PE	Sent by printer to indicate a Check condition. High true.	12
SLCT	Sent by printer when PE is low, and operator has activated the ON LINE pushbutton. High true.	13, 32
GND	Zero volts.	16, 33
+5V	Supply voltage for Exerciser only.	18
Chassis Gnd	Connection for cable shield.	17
None	Not used.	30, 31, 34, 35, 36

DATAPRODUCTS CORP. INTERFACE

Certain jumpers must be installed on the Logic A PCBA in order to work with a Dataproducts-compatible interface. Install jumper W4, and install W5 if the PI (VFU Control) line is *not* used. If the interface uses low-true logic, be sure to connect jumper W7 on the Logic A PCBA (refer to *Jumpers*).

The demand/response timing scheme permits a maximum transfer rate up to 500,000 characters per second. Figure 8 shows timing of control signals exchanged in transferring a data character.

Table 3 lists all the different lines that link the printer to the user's controller, and describes the function of each and its pin assignment on the interface connector at the printer.

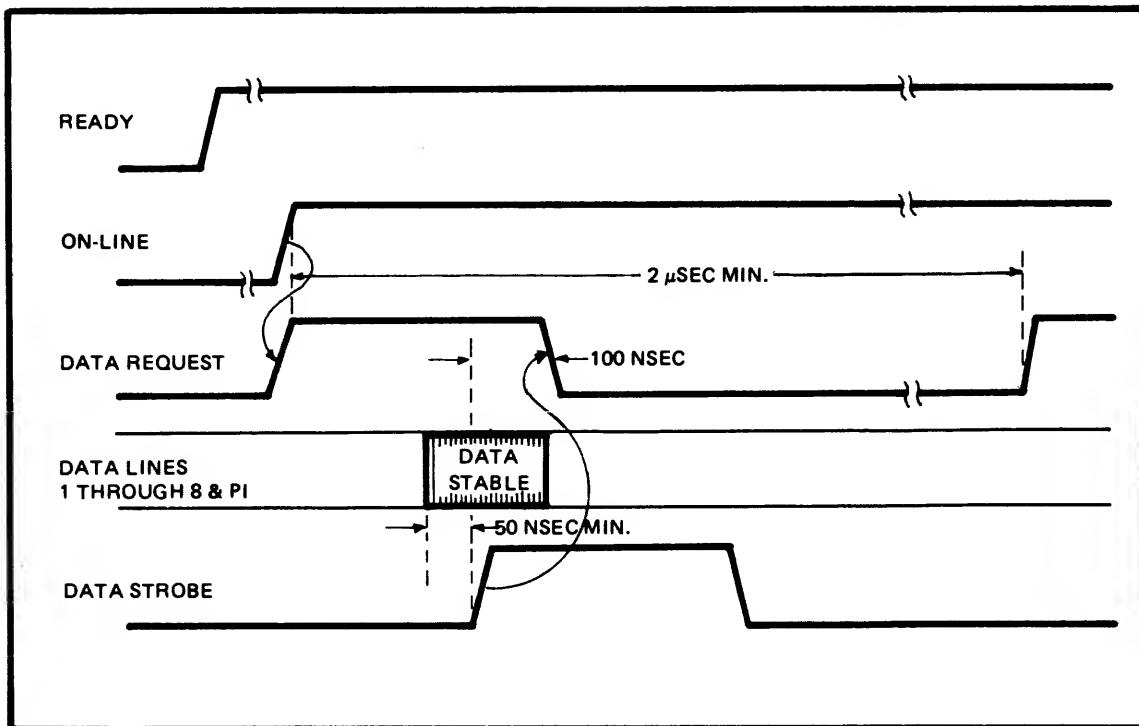


Figure 8. Timing of Dataproducts Interface

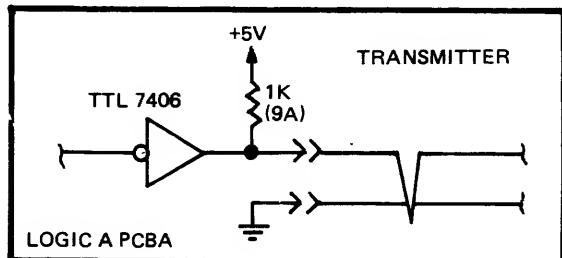
Table 3. Dataproducts Interface Line Functions

Signal	Description	Connector Pin
Data Request	Sent by printer to synchronize data transmission. When true, requests a character. Remains true until Data Strobe is received, then goes false within 100 nsec.	E (return C)
Data Strobe	Sent by user system to cause printer to accept information on data lines. Should remain true until printer drops Data Request line. Data lines must stabilize for at least 50 nsec before Data Strobe is sent.	j (return m)
Data Bit 1 Data Bit 2 Data Bit 3 Data Bit 4 Data Bit 5 Data Bit 6 Data Bit 7 Data Bit 8	Bit 8 controls optional character set. Refer to <i>Commands and Formats</i> .	B (return D) F (return J) L (return N) R (return T) V (return X) Z (return b) n (return k) h (return e)
VFU Control (PI)	Optional control from user system. Used for VFU control. Data Request/Strobe timing is same as for data lines.	p (return s)
Ready	Sent to user system by printer. True when no Check condition exists.	CC (return EE)
On Line	Sent to user system by printer. True when Ready line is true and operator has activated ON LINE pushbutton. Enables interface activity.	y (return AA)
Interface Verify	Jumper in printer connector. Continuity informs user system that connector is properly seated.	x to v
+5V	Supply voltage for Exerciser only.	HH

TRANSMITTER/RECEIVER CIRCUITS

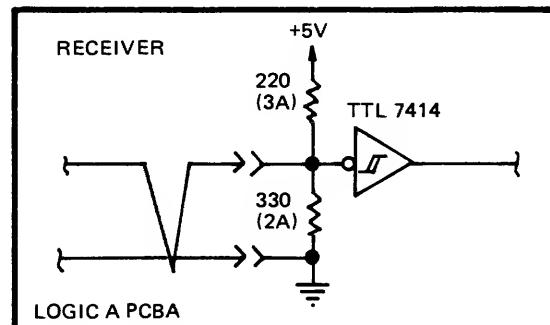
Transmitter

The transmitter for both Dataproducts and Centronics interfaces is a TTL 7406-type device with a 1000-ohm pull-up resistor to +5V. Other values of resistance may be substituted as required (refer to *Installation*).



Receiver

The receiver in the Dataproducts interface is a TTL 7414-type device without termination resistors (which may be added by the user). The Centronics interface includes a 1000-ohm pull-up resistor. Other values of resistance may be substituted as required (refer to *Terminating Resistors*).



OPERATING THE PRINTER

GENERAL

The operator has four principal jobs to do:

- loading paper
- verifying printer readiness, and putting the printer on-line
- changing the ink ribbon, as required

- cleaning the printer periodically, or as required.

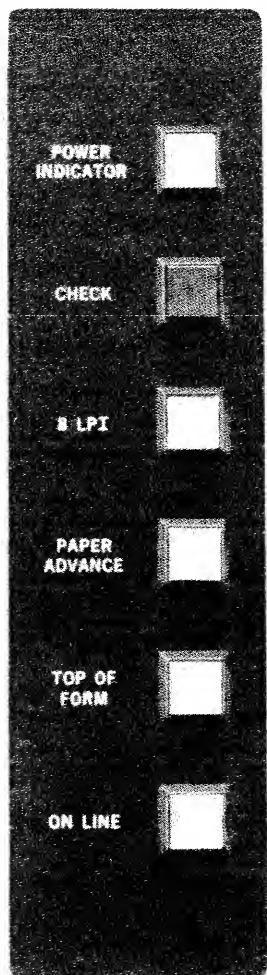
OPERATOR PANEL

Table 4 lists each control and indicator on the operator panel, and explains its use. Figure 9 shows the operator panel. For complete printer operating instructions, refer to the *Operator's Manual* (P/N 102486).

Table 4. Controls and Indicators

Control/Indicator	Function
POWER on/off toggle switch	Turns on AC power to printer power supply.
POWER indicator	Lighted when AC power switch is turned on .
PAPER ADVANCE pushbutton	While held down, causes paper to advance. Not active when on-line.
CHECK pushbutton/indicator	Lighted when: <ul style="list-style-type: none">• platen is in Load position,• paper has run out,• there is no paper motion during print mode,• Clutch Lever on Mechanical VFU (option) is not engaged, or• any internal supply voltage is abnormal. Light goes out when fault is cleared, except CHECK pushbutton must be pressed after paper motion fault is cleared.
TOP OF FORM pushbutton/indicator	Momentary-action switch causes paper to advance to top of next form (or to Channel 1 if VFU is loaded). Operational only when printer is off-line. Lights only when Electronic VFU is loaded, or when a tape is installed on the Mechanical VFU. Always on if printer includes optional Forms Length Selector.
8LPI pushbutton/indicator	Momentary-action switch selects line spacing of either eight lines per inch (lighted), or six lines per inch (unlighted). Operational at Operator Panel only when printer is off-line.
ON LINE pushbutton/indicator	Momentary-action switch enables printer control through the interface (lighted), or disables the interface (unlighted). Printer cannot go on-line if the CHECK indicator is lighted.

Figure 9. Operator Panel



SITE PREPARATION

GENERAL

The Printer is usually installed in an air-conditioned computer room or office-type environment. Be sure that the installation site allows air to move freely around the Printer, and that ambient temperature remains in the range from +10°C to +38°C.

The Printer contains a static eliminator (figure 10) which permits troublefree paper handling even in periods of extremely low humidity.

The AC power voltage may be 100, 110, 120, 200, 220, or 240 volts (+10%, -15%). A kit is available to facilitate modification for a different AC power voltage (refer to *Configuring the Printer*).

The AC power voltage and frequency for which the Printer is configured is indicated on labels located on the rear of the Printer base.

The Printer requires 450 watts operating (nominal), with short-term peaks to 800 watts. Standby

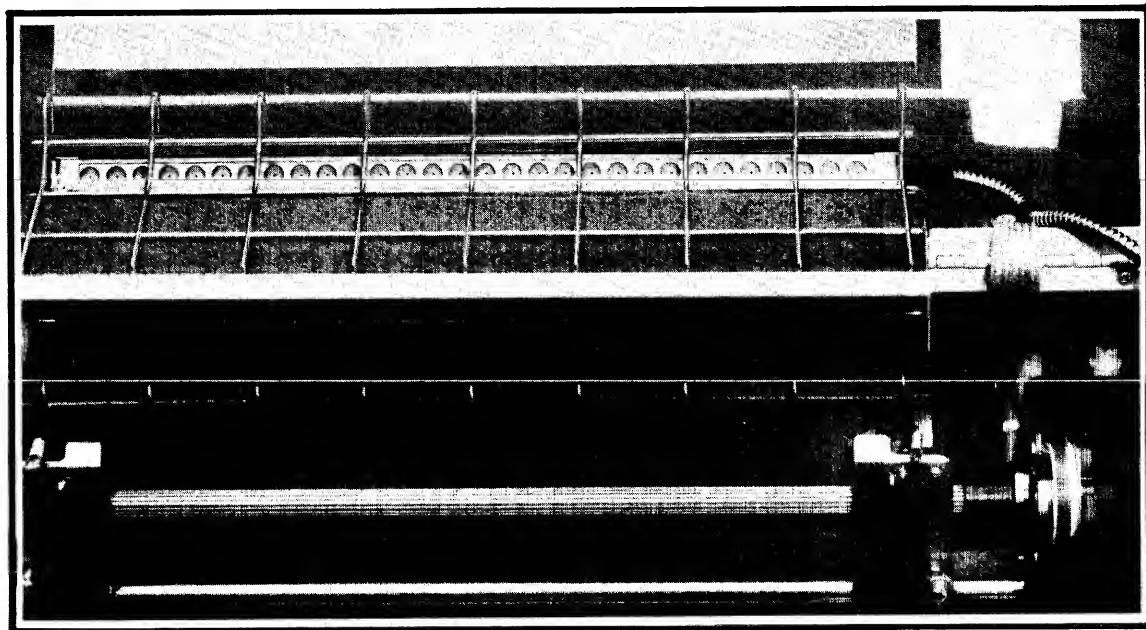


Figure 10. Static Eliminator

The site should allow at least three feet of clear space behind the Printer to permit access to the printed fanfold paper stack below the Printer.

POWER

The Printer requires a source of 60-Hz or 50-Hz, single-phase power. No electrical change is required in order to change between 50-Hz and 60-Hz power. However, it is necessary to change a motor pulley to adapt to a different line frequency (refer to *Configuring the Printer*).

power requirement is 200 watts.

CABLES

Using the standard TTL I/O interface, the distance from the Printer to the controller must not require more than 40 feet of twisted-pair or flat cable. A Long Lines Interface option is available which permits using up to 500 feet of I/O cable with a Dataproducts-type interface.

The I/O cable should be shielded with the shield terminated at chassis ground on both sides.

PREPARING TABLE TOP FOR THE PRINTER

The Printer is normally furnished with a special pedestal, but a table may be prepared for mounting the Printer. The table must have a slot cut through its surface to allow paper to enter the bottom of the Printer. Cut the slot $1\frac{1}{2}$ inches wide and 17 inches long, with the front edge of the slot eight or nine inches from the front edge of the table (figure 11). Locate the center of the 17-inch slot approximately four inches to the left of the center of the area to be occupied by the Printer.

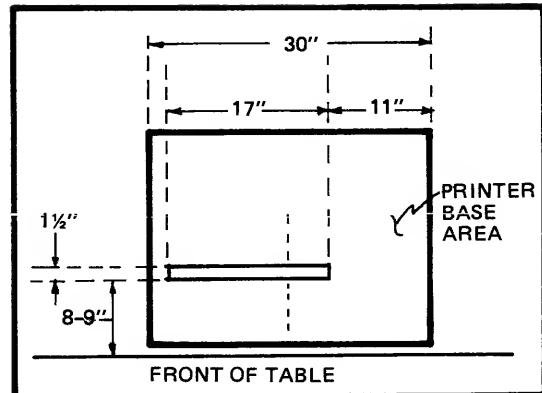


Figure 11. Preparing Printer Table

INSTALLING THE PRINTER

GENERAL

The Printer is usually installed on the matching Printronix pedestal, but it may instead be mounted on a table prepared for it (refer to *Site Preparation*).

INSTALLING PRINTER ON PEDESTAL

To assemble the pedestal and then install the Printer on it, proceed as follows:

a. Assemble pedestal legs to modesty panel, and install glides following assembly instructions furnished with pedestal.

b. Lay Printer on its rear surface to expose printer bottom (use cardboard to protect Printer finish).

c. Remove the four rubber feet from the Printer bottom, using a screwdriver.

d. Locate the four threaded holes in the Printer bottom that *did not* retain the rubber feet removed in step c. These holes will receive screws that hold the Printer to the pedestal (figure 12).

e. Raise Printer and rest it on pedestal, aligning holes prepared in step d with matching holes in top bars of pedestal.

f. Secure Printer to pedestal using the four 10-32 x 5/8-inch screws furnished with the pedestal.

g. Using a wrench, adjust pedestal glides until Printer is leveled (so that the Printer front cover opens and closes evenly and easily).

h. Open front cover, then cut and remove cable tie that holds Forms Thickness Adjustment lever

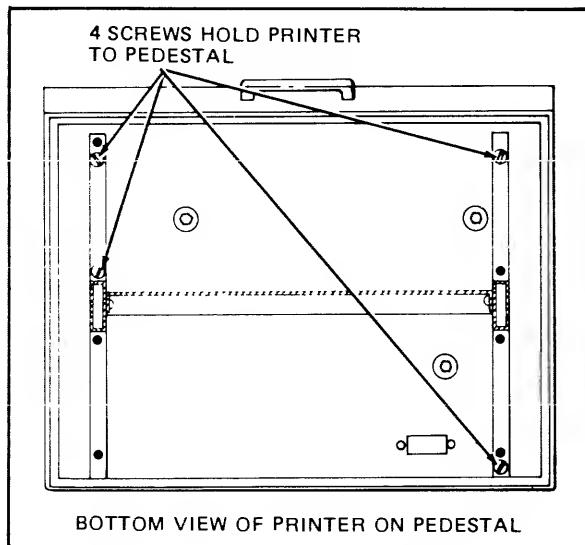


Figure 12.

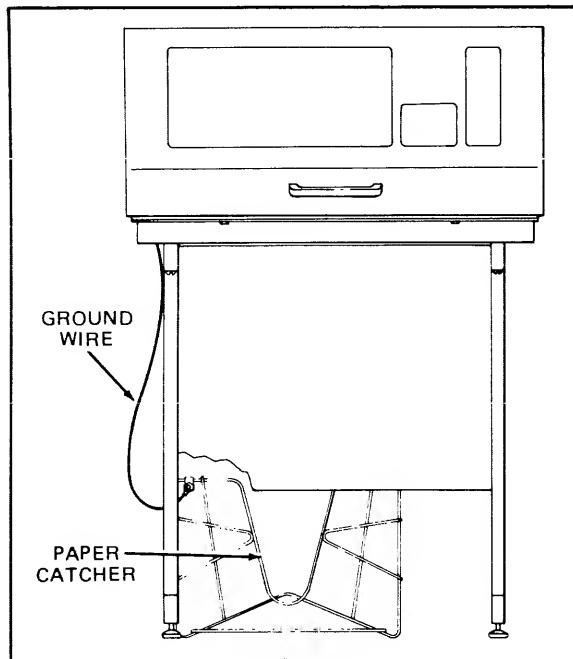


Figure 13.

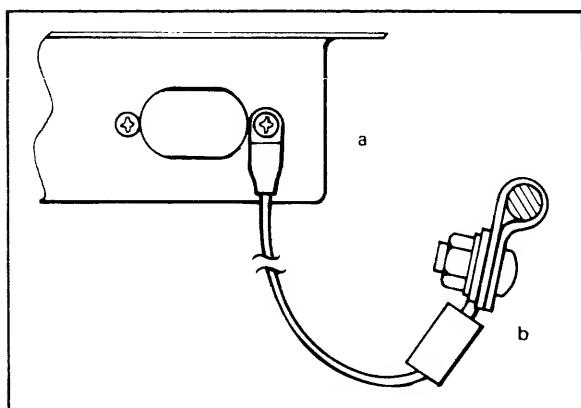


Figure 14.

in the "Load" position (protects platen during shipment).

i. Place paper catcher (wire basket) on floor between pedestal feet, with one end against left-hand base of pedestal (figure 13).

j. Install ground wire between printer and paper catcher as follows:

1. Connect quick-disconnect end of ground wire (furnished) to terminal at AC power connector on rear of printer (figure 14a).

2. Assemble other end of wire (with ring terminal) to clamp, lockwasher, screw, and nut (figure 14b) with clamp gripping larger wire on paper catcher.

k. Connect the AC power cable, and the interface cable, to mating connectors on the rear of the Printer.

INSTALLING PRINTER ON TABLE

If the printer is to be operated on a table prepared for it (refer to *Site Preparation*), install the Printer as follows:

a. If Printer may have formerly been installed on a Printronix pedestal, check to make sure that rubber feet are installed in corners of Printer

base. Rubber feet should be used for table installation.

b. Lift Printer onto table in the area prepared for it.

c. Open front cover, then cut and remove cable tie that holds Forms Thickness Adjustment lever in the "Load" position (protects platen during shipment).

d. Load paper, adjusting position of Printer on table, and position of blank forms under table, so that paper passes through the slot in the table top with minimum friction against slot edges, and with $\frac{1}{2}$ -inch clearance from each end of the slot.

e. Arrange paper catcher on table behind Printer, or on floor behind table. If a metal paper catcher is used, install ground wire between Printer and catcher, following instructions in *Installing Printer on Pedestal*, step j.

f. Connect AC power cable, and the interface cable, to mating connectors on the rear of the Printer.

This completes installation procedures.

CONFIGURING THE PRINTER

GENERAL

Unless the Printer has been configured at the factory exactly for the specific application, it may be necessary to perform certain procedures in order to fit the Printer for the application.

The printer may also require configuration to meet requirements of changing applications, power sources, etc.

Procedures may include the following:

- Installing or changing wire jumpers or termination resistors to adapt for different interfaces, or to disable or implement certain Printer functions.
- Rewiring to adapt for a different AC power voltage.
- Changing a pulley to adapt for a different AC power frequency.

In addition, it may be necessary to provide a set of special characters. Widely available PROM devices may be programmed in the field to provide special character sets.

JUMPERS

Both the Logic A PCBA and the Logic B PCBA have a single 14-pin DIP platform used to connect jumpers selecting different printer functions. The Logic B PCBA also has other jumper positions where printed circuit jumpers may be cut, or wire jumpers added, to achieve the desired operation.

The following paragraphs describe each function, and defines the jumper connection that selects each function. Table 5 summarizes jumper connections and functions.

CAUTION

Never remove or replace a PCBA with power applied to the Printer. Component damage could result from such practice.

To remove either logic PCBA, swing open the card cage (secured by a magnetic latch at the right-hand end) through the rear of the Printer, then remove the PCBA using the ejector levers (figure 15).

Figure 16 shows the location of the jumper platform at location 8K on either the Logic A or Logic B PCBA.

Figure 17 shows locations and identification of jumpers at other places on the Logic B PCBA.

Jumpers on Logic A PCBA — Location 8K

Automatic Line Feed (W1) — If pins 1 and 14 are *not* connected together, any characters beyond the 132nd character preceding a function code (LF, FF, CR, etc.) are lost. However, for applications (such as in data communications systems) where the incoming data may not contain appropriate function codes, the Printer is able to automatically issue a Line Feed (LF) command after the 132nd character so that all data is printed. To implement this option, connect pins 1 and 14 (W1) together.

Line Feed with Carriage Return (W2) — If pins 2 and 13 are *not* connected together, a Carriage Return (CR) code will *not* cause data to be printed, or cause paper to advance, and a separate Line Feed code is needed to advance to the next line. However, if pins 2 and 13 (W2) are connected together, a Carriage Return code will act as a Line Feed command.

Note that when jumper W2 is installed, a CR/LF sequence will cause the Printer to perform a double line feed (double space). This configuration excludes the ability to underline characters.

Underline (W3) — This jumper permits inhibiting the Underline function. If pins 3 and 12 are *not* connected together, the normal Underline function is enabled. Connect pins 3 and 12 together to inhibit underlining. Note that the Underline function is inhibited if either jumper W1 or W2 is installed, even if jumper W3 is omitted. Also note that if the Underline code 137₈ is utilized in a special character set, Underline must be disabled by connecting jumper W3.

Data Line 8 (W4) — Data line 8 is used only to access the optional extended character set. If the extended character set is used, *omit* jumper W4. In all other cases, this jumper *must be connected* between pins 4 and 11.

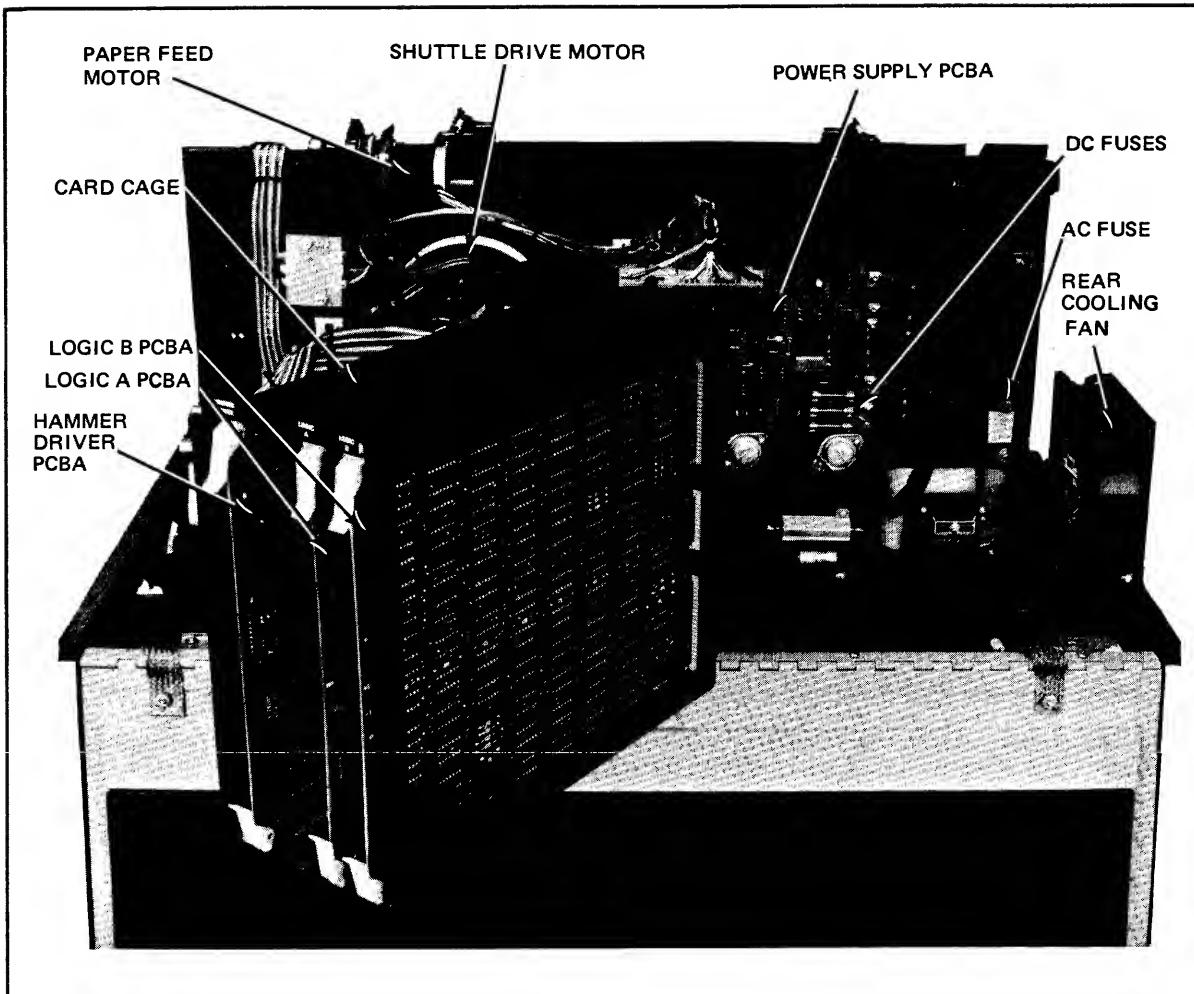


Figure 15. Access to Printed Circuit Boards

VFU Control (W5) — If this jumper is *not* connected between pins 5 and 10, the Electronic or Mechanical VFU operates in conjunction with the PI interface line. When the PI line is not used, jumper W5 must be installed. Note that the "binary count" function of the Electronic VFU cannot be used when jumper W5 is installed. (W5 is usually installed in a Centronics interface.)

Upper-Case Enable (W6) — The Printer normally includes the full 96-character ASCII set. If lower-case PROM devices are absent and jumper W6 is *not* wired, the Printer will leave a space in response to a lower-case character code.

If lower-case PROMs are absent and jumper W6 is wired, an equivalent upper-case character will be printed in response to a lower-case character code.

If jumper W6 is wired when lower-case PROMs are installed in the Logic A Board, a received

lower-case character code will cause a garbled character to be printed.

Polarity Select (W7) — This jumper is installed between pins 7 and 8 only for a special Data-products configuration utilizing low-true interface logic. For all normal configurations the jumper *must* be omitted.

Jumpers on Logic B PCBA — Location 8K

Skip-over Perforation (W1, W2, W3) — The skip-over perforation function causes the paper to advance a preset number of lines as printing nears the bottom of the form, so that printing resumes near the top of the next form without printing on (or near) the line of perforations separating the forms.

For example, with a 66-line form printing at 6 lines per inch, the Printer may be made to skip from line 60 to line 1 of the next form.

Three jumpers control the skip-over function. Jumpers are:

W1 (pins 1 and 14)
W2 (pins 2 and 13)
W3 (pins 3 and 12)

If W3 is not wired, the skip-over function is disabled regardless of other jumpers W1 and W2. Different connections of the three jumpers produce different skip-over distances, as follows:

Jumpers	6 LPI	8 LPI
W3 only	6 lines	8 lines
W3 and W1	5 lines	6 lines
W3 and W2	4 lines	5 lines
W3 and W2 and W1	3 lines	4 lines

Note that the skip-over perforation function is deactivated when the Electronic VFU is loaded, or when the Mechanical VFU or Forms Length Selection option is used.

Plotting Speed (W4) — If jumper W4 is connected between pins 4 and 11, maximum plotting speed will be doubled (to 40 rows per second, or 33½ inches per minute) in Plot Mode operation.

There are some limitations to double-speed plotting. Hammer coils may become overheated by printing solid or near-solid black areas over an extended range. An overheated coil will usually be indicated by light or missed dots. In general, it is good practice to avoid printing more than 25 percent of possible dots per hammer per page.

Note that if the Printer cannot transfer a full line of plot data during the one-millisecond window allowed for transfer, the Printer will automatically revert to standard-speed plotting.

For normal printing speed, omit jumper W4.

Paper Motion Detector (W6) — This jumper is connected between pins 6 and 9 at the factory

and permits the paper motion detector to operate. It should be removed only to defeat the paper motion detector when paper of certain colors is used.

VFU Disable (W7) — This jumper, connected between pins 7 and 8, disables the VFU and received VFU control codes are ignored. Omit W7 for normal Electronic VFU operation.

Jumpers on Logic B PCBA — Other Locations

8 LPI = 10 LPI — At location 10A only on Logic B4 PCBA (or subsequent). Selects either 8 LPI or 10 LPI line spacing when 8 LPI spacing is selected by the operator or controller.

The Printer is normally furnished configured for 8 LPI, determined by printed circuit jumpers W9 (pins 2 and 13) and W13 (pins 6 and 9).

For 10 LPI, cut printed circuit jumpers W9 and W13, then install wire jumpers W10 (pins 3 and 12) and W14 (pins 7 and 8).

8 LPI Spacing Only — At location 11A only on Logic B4 PCBA (or subsequent). When jumper W15 is installed, Printer automatically selects 8 LPI when power is applied, excluding 6 LPI operation under either manual or remote control. Remove jumper W15 to enable choice of 8 LPI or 6 LPI.

Paper Out Delay Override — Location 11K, jumpers W27, W28. The Printer is furnished configured so that, after a "paper-out" fault occurs, the Printer is able to print an additional 12 lines before stopping in response to the fault. This permits printing in the bottom 2 inches of the last form. The printed circuit jumper W28 (pins 7 and 8 in location 11K) enables this function.

To cause the Printer to respond immediately to the fault (leaving the bottom 2 inches of the last form blank), cut printed circuit connection W28, and install wire jumper W27 between pins 6 and 9.

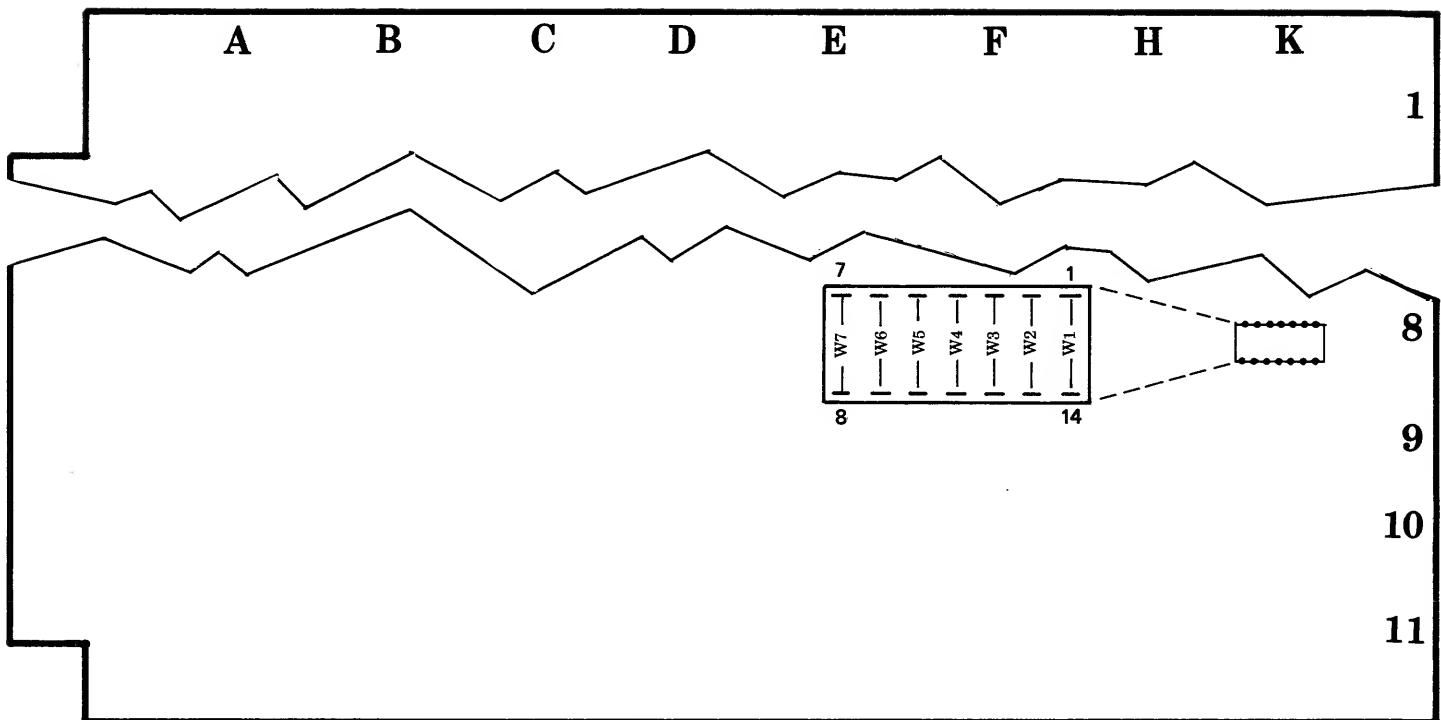


Figure 16. Jumper Platform 8K, Logic A and Logic B PCBA

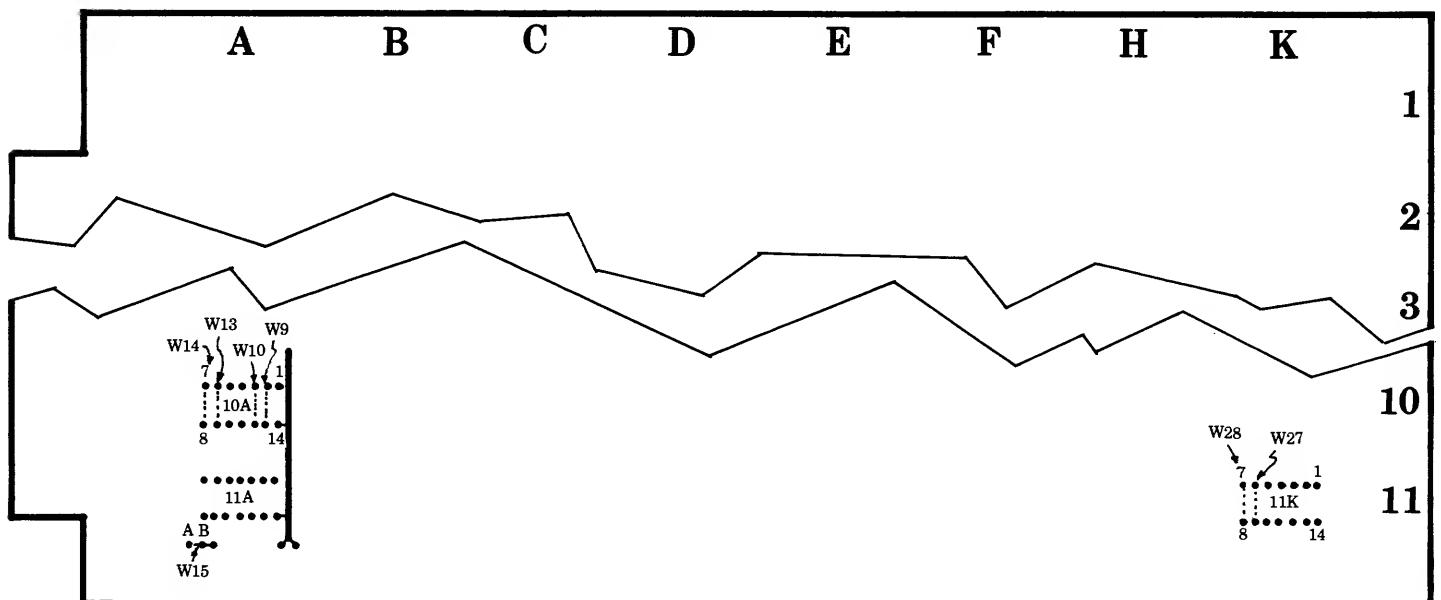


Figure 17. Jumper Platform 8K, Logic B PCBA, Other Locations (Model B4 or Subsequent Only)

Table 5. Summary of Jumper Functions

Function	Jumper	Pins	Explanation
Logic A PCBA, Location 8K Automatic Line Feed	W1	1-14	Connect for automatic line feed at 132nd character.
Line Feed with Carriage Return	W2 ¹	2-13	Connect to cause CR command to act as LF Command
Underline	W3	3-12	Connect to disable underline function.
Data Line 8	W4	4-11	Connect when Data Line 8 is not used. Always connect for Centronics compatibility.
VFU Control (PI)	W5 ²	5-10	Connect when PI line is not used. Always connect for Centronics compatibility.
Upper-case Enable	W6	6-9	Connect to cause equivalent upper-case character to be printed in response to a lower-case code. Always omit when lower-case PROMs are installed.
Polarity Select	W7	7-8	Connect for low-true interface only. Do not connect for high-true interface.
Logic B PCBA, Location 8K Skip-over Perforation	W1 W2 W3	1-14 2-13 3-12	Connect to select required skip-over distance (refer to text). Ignore if using Electronic or Mechanical VFU or Forms Length Switch option.
Plotting Speed	W4	4-11	Connect to permit double-speed plotting at lower densities.
	W5	5-10	Not presently used.
Paper Motion Detector	W6	6-9	Connect to enable paper motion detector. (Factory installed.)
VFU Disable	W7	7-8	Connect to disable all VFU functions.
Logic B PCBA, Location 10A 8 LPI/10 LPI	W9 W13 W10 W14	2-13 6-9 3-12 7-8	For 8-LPI spacing retain W9 and W13, omit W10 and W14. For 10-LPI spacing cut etch jumpers W9 and W13, and install jumpers W10 and W14.
Logic B PCBA, Location 11A 8LPI (10LPI) Only	W15	A-B	Connect to select 8-LPI (10-LPI) spacing only, excluding 6 LPI.
Logic B PCBA, Location 11K Paper-Out Delay Override	W28	7-8	Retain to allow printing last two inches on last form.
	W27	6-9	Connect, and cut W28, for immediate response to paper-out fault.

¹May be required for Centronics compatibility.²Required for Centronics compatibility.

TERMINATING RESISTORS

The Logic A PCBA is usually furnished with interface lines terminated with 1K-ohm resistors. The resistors are in an in-line resistor pack in locations 3A (receiver pull-up) and 9A (transmitter pull-up) on the Logic A PCBA.

The shipping kit contains two other resistor packs, one with 220-ohm resistors, and the other with 330-ohm resistors. The 220-ohm resistors may be installed in location 3A for receiver pull-up, in place of the 1K-ohm resistors. Where receiver pull-down resistors are appropriate in conjunction with the 220-ohm pull-up resistors, install the 330-ohm resistor pack in location 2A. (The pull-down resistors are commonly used along with the 220-ohm pull-up resistors.)

INSTALLING CHARACTER MEMORY PROMS

The standard printer is furnished with PROM devices for 96 characters, installed in the Logic A PCBA (figure 18). Up to 160 characters may be installed in those in up to four additional optional PROM devices. Note that for PROM pairs with identical part numbers, the -10 device is installed in the lower socket (for example, 2F), and the -11 device is installed in the upper socket (for example, 1F).

CODING CHARACTER MEMORY PROMS

Character memory PROMs are of a type typified by the Texas Instruments No. 74S287 or 74S387. Each character is formed by an 8 x 8 matrix, or 64 bits. The PROM device is a 256 x 4 memory, and two PROMs are required to encode 32 characters.

Detailed instructions for coding and preparing PROMs are contained in the *Printronix Procedure, PROM Coding* (Drawing No. 102043), available from Printronix.

ADAPTING POWER SUPPLY FOR LINE POWER VOLTAGE

The Printer is shipped configured to operate with 120V AC line power (standard), or with some other AC voltage specified by the purchaser. Power kits are available for cases when the Printer must be reconfigured in the field to operate with some other voltage. Kit P/N 102422 is used to adapt a Printer for 100V, 110V, or 120V AC power. Kit P/N 102421 is used to adapt for 200V, 220V, or 240V AC power.

Preparing Printer for Rewiring

To prepare the Printer for voltage rewiring, perform the following steps.

- a. Remove AC power cable from rear of unit.
- b. Open rear access door, and swing out card cage.
- c. Remove the two screws that hold the power supply PCBA to the power supply frame (figure 19).
- d. Move power supply PCBA to the left to expose screw that secures left-hand side of fuse housing (figure 19).
- e. Remove nuts that secure fuse housing, then remove fuse housing to expose transformer taps.

Wiring for 100V, 110V, or 120V

Figure 20 shows the arrangement of taps for line voltages of 100V, 110V, and 120V. Rewire using Power Kit P/N 102422.

- a. Disconnect both ends of any wire connected to terminals of fuse F2. (One wire will be terminated at the power switch terminal SW1-3, and the other wire will be terminated at a transformer tap.) Remove the wires from the Printer.
- b. Connect wire between SW1-3 and the appropriate transformer tap indicated in figure 21.
- c. Install transformer tap jumpers as shown in figure 21.

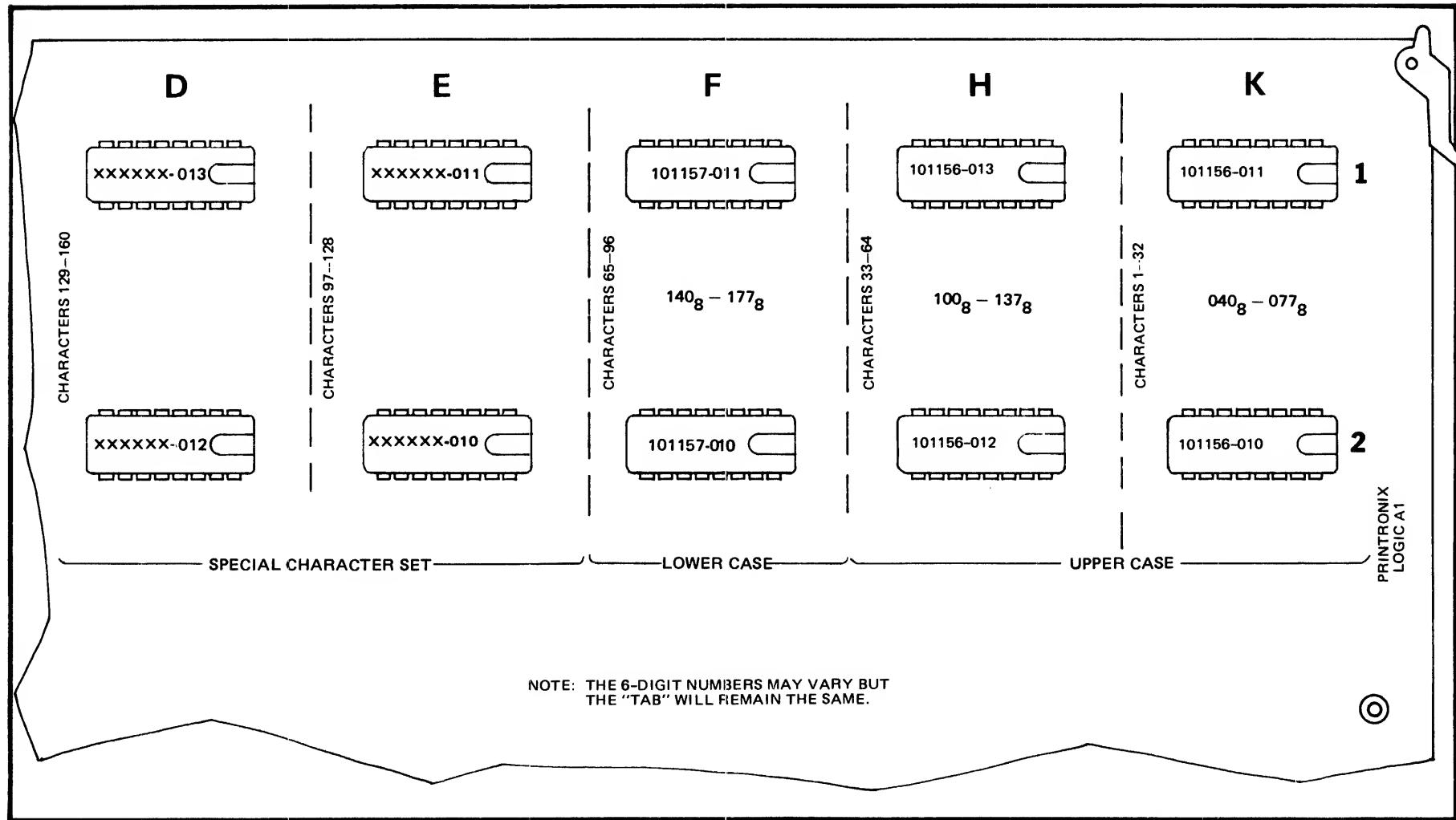


Figure 18. Location of Character Memory PROMs

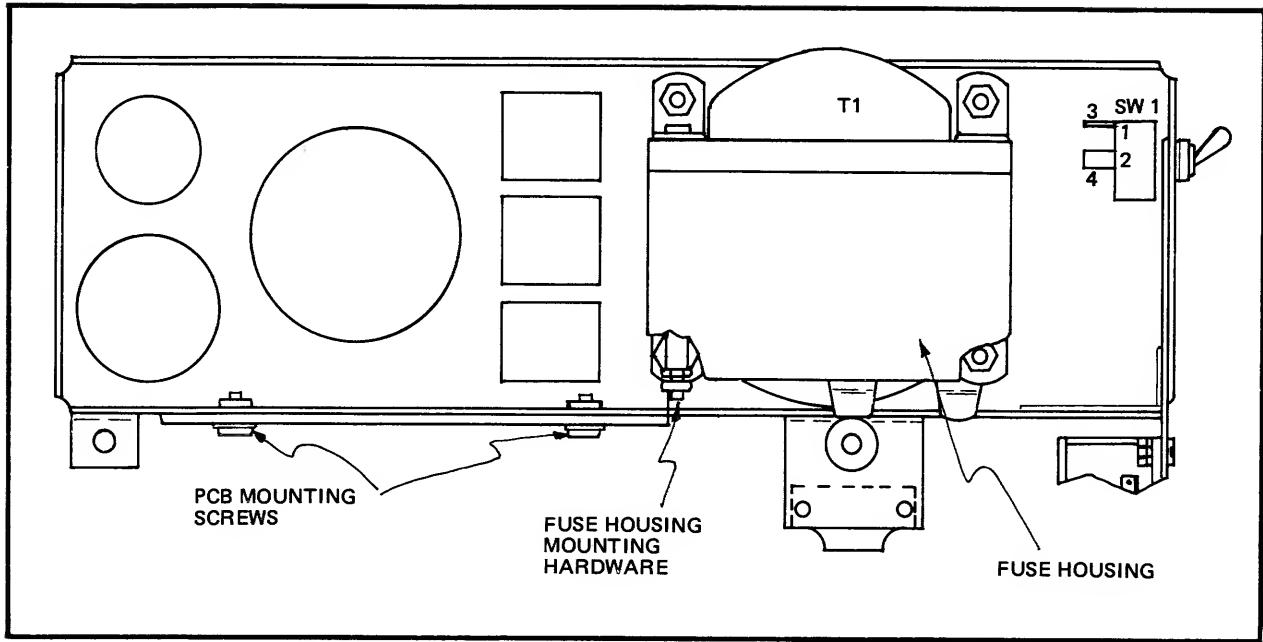


Figure 19. Hardware for Access to Transformer Tap Terminals

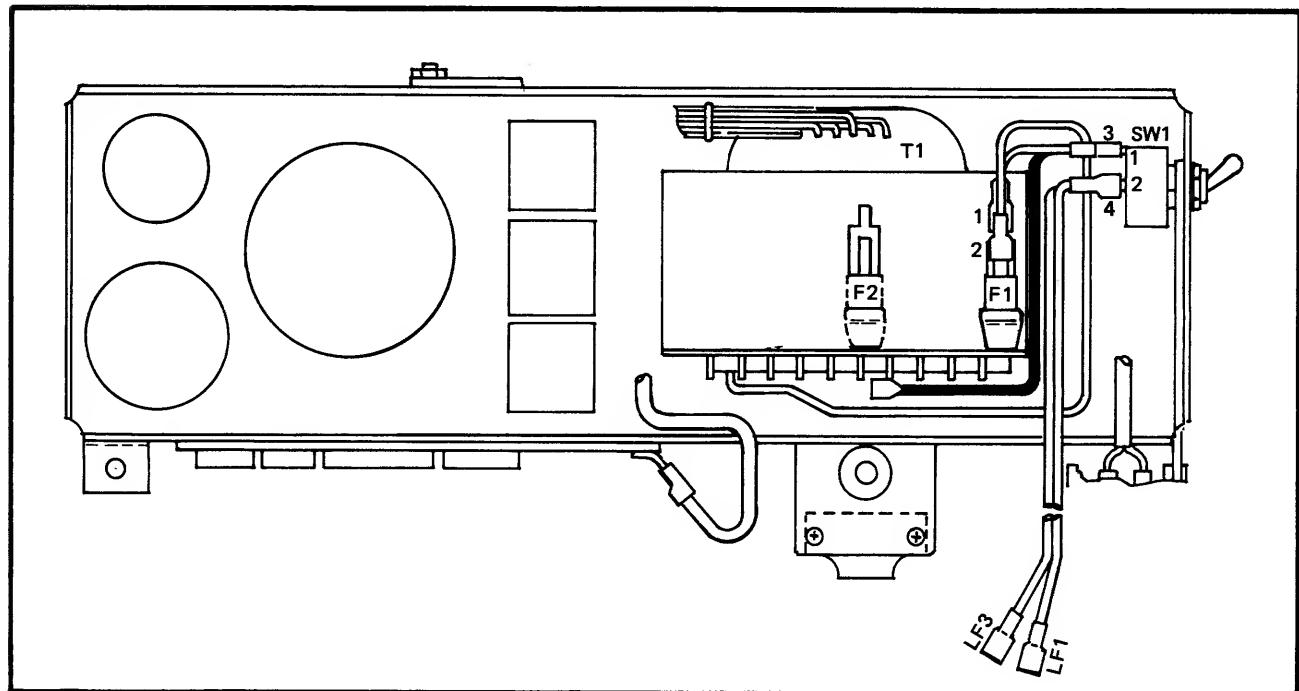


Figure 20. Wiring for 100V/110V/120V

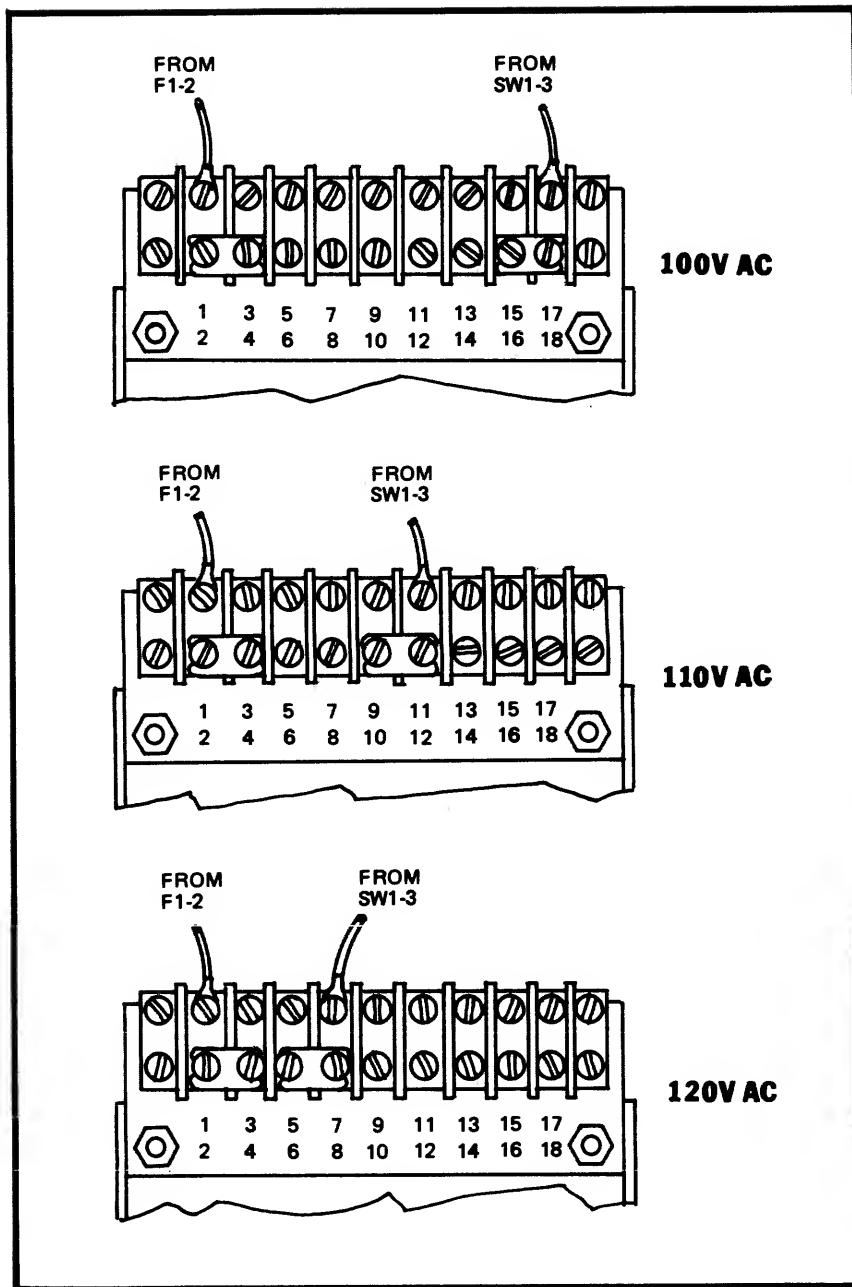


Figure 21. Transformer Connections for 100V/110V/ 120V

Wiring for 200V, 220V, or 240V

Figure 22 shows the arrangement of taps for line voltages of 200V, 220V, and 240V. Rewire using Power Kit P/N 102421.

- Remove wire from power switch terminal SW1-3 (figure 22) and from transformer tap at other end of that wire. Remove wire from the Printer.
- Connect wire from fuse terminal F2-1 to terminal SW1-3.
- Connect wire from fuse terminal F2-2 to the appropriate transformer tap indicated in figure 23.
- Install transformer tap jumper as indicated in figure 23.

Restoring Printer to Operation

After wiring and jumpers have been installed, proceed as follows:

- Replace fuse housing on its mounting screws, replace washers and nuts, and tighten nuts.
- Hold power supply PCBA in its normal position against the power supply frame, and then replace Phillips-head screws and tighten.
- Swing card cage inside the cabinet and close the rear access door.
- Replace line power cord. Be sure to use Power Cord P/N 101535-001 for 100V/110V/120V, and use Power Cord P/N 102512-001 for 200V/220V/240V.

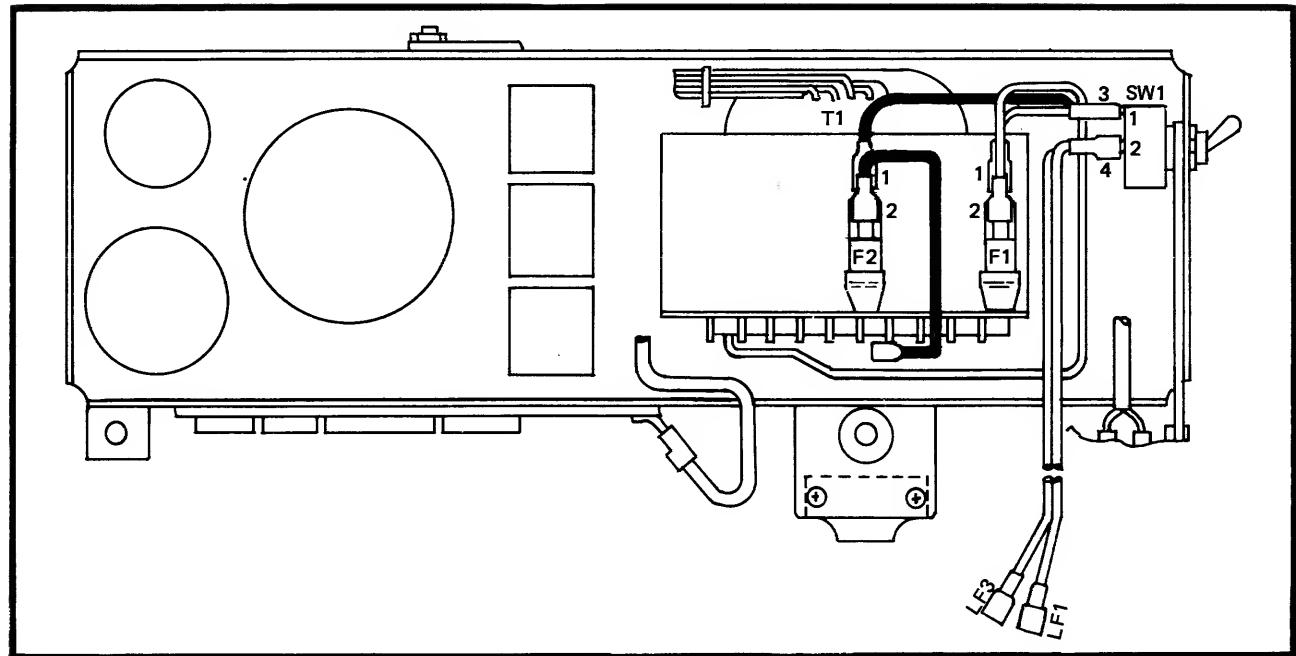


Figure 22. Wiring for 200V/220V/240V

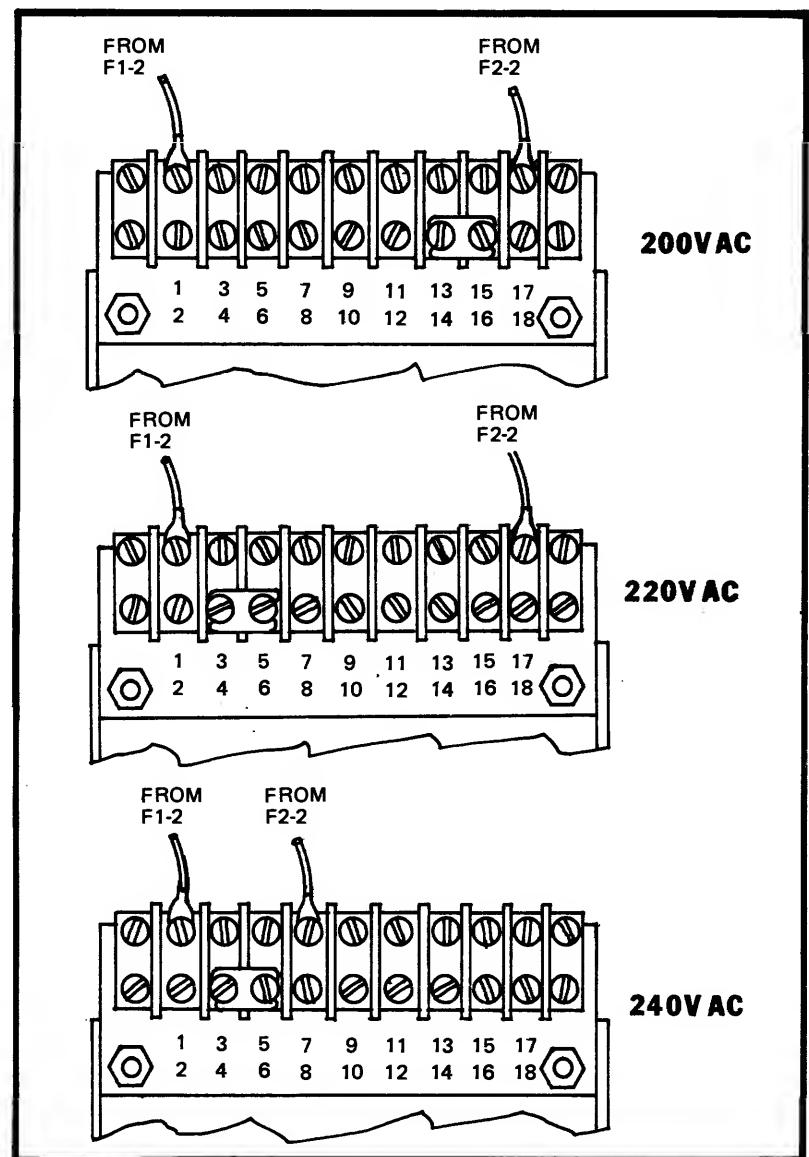


Figure 23. Transformer Connections for 200V/220V/240V

e. Revise the power voltage label (figure 24) to indicate the AC voltage for which the Printer has been configured.

f. Revise the power requirement label to be sure that it reflects the appropriate voltage and current ratings.

The Printer is now ready for operation with the new line voltage.

ADAPTING PRINTER FOR LINE FREQUENCY

If the Printer is configured for either 50-Hz or

60-Hz line power but is to be operated in a location supplying power at the other frequency, the shuttle drive motor pulley assembly must be replaced in order to maintain shuttle timing relationships.

For these procedures, refer to *Replacing Shuttle Drive Motor and Pulley*, in the Printronix 300 Maintenance Manual. Be sure that correct parts are obtained, as follows:

Frequency	Kit
50 Hz	P/N 102133-001
60 Hz	P/N 102134-001

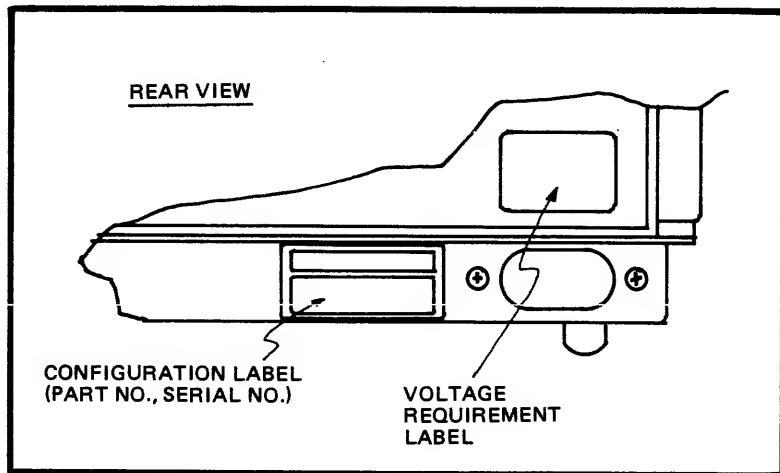


Figure 24. Label Locations

OPTIONS

GENERAL

The following pages contain summary descriptions of several Printer options, along with information useful in configuring a system in anticipation of adding these options.

Options included are:

- Forms Length Selector
- Mechanical VFU
- RS232 Interface
- Long Lines Interface
- Block Character Printing

FORMS LENGTH SELECTOR

The Forms Length Selector option may be used on any Printronix Printer which does *not* include the Mechanical VFU. With the Forms Length Selector, the operator may preset any form length up to 16½ inches in one-sixth-of-an-inch increments, using the two thumbwheel switches.

The option kit includes a printed circuit board (PCBA), cover, cable, special Printer Control Panel, and mounting hardware. To install the Forms Length Selector, proceed as follows:

a. Install the wire jumper on the PCBA (figure 25) to select Skip-over Perforation distance. For a skip-over of ½ inch, install a wire jumper across pads marked SK3. For a skip-over of 1 inch, install

the jumper across pads marked SK6.

b. Turn off power to Printer.

c. Open Printer rear door and swing out card cage, and open front cover of Printer.

d. Disconnect cable connector from J1 on Logic B PCBA, and then remove Printer Control Panel from front cover.

e. Remove front Cam Cover Plate. Keep hardware and gasket, and clean up any oil seepage.

f. Install Control Panel furnished in the kit (P/N 101578-002) in front cover, and run and connect appropriate cable to J1 on Logic B PCBA.

g. Run the remaining cable along right-hand side of printer (along with ribbon deck wiring) to front of cam box.

h. Using hardware in the kit, attach cable connector furnished in right-hand side of PCB Holder (P/N 102398-001), orienting connector with pin 1 in front, right-hand corner.

i. Install PCB Holder in place of the original front cam cover, using gasket and screws removed in step e.

j. Install Forms Length Selector PCBA in left-hand connector in PCB Holder, and secure with two screws furnished.

k. Install Cover (P/N 102319-002) over PCBA and secure using screws furnished.

l. Close card cage and rear door, and close front cover. Power may now be applied and the Forms Length Selector function checked-out. Refer to the Printronix 300 *Operator's Manual* for instructions for operating the Forms Length Selector.

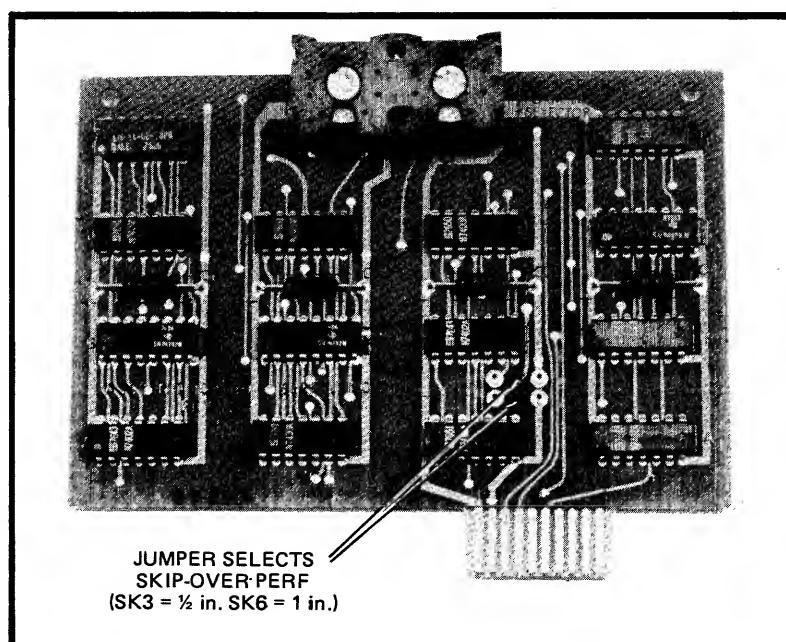


Figure 25. Forms Length Selector PCBA

MECHANICAL VFU

The Mechanical VFU (Vertical Formatting Unit) controls vertical formatting using a program on 1-inch-wide, 2-channel or 8-channel perforated tape.

The Mechanical VFU (MVFU) consists of an electromechanical assembly which is coupled directly to the paper feed tractor shaft, and a small printed circuit board connected to the assembly by an integral connector. The printed circuit board plugs into the connector located at the right-hand side of the printer mechanism, in front of the cam cover.

The Mechanical VFU may be installed in the field. Complete installation instructions are included in the Mechanical VFU kit.

Blank tape, punching and splicing devices, and other accessories may be obtained from most data processing supply houses. Tapes may be prepared either manually or on automatic tape punching equipment (such as a Teletype machine).

Other particulars include:

No. of Channels 2 or 8.
Tape Standard 1-inch-wide, 1/10 pitch opaque mylar or paper tape, round role punched.
Tape Length 12 inches (120 holes) minimum, 16.8 inches (168 holes) maximum.
Top of Form/Bottom of Form Channels ... Selectable by jumpers.
Power Requirements +5V DC, 610 ma max, from Printer supply.

The MVFU circuit board contains locations for a number of jumpers. The jumpers may be installed to order at the factory, or the MVFU may be configured, or reconfigured, in the field. Table 6 describes the function and configuration of each jumper to achieve specific operating characteristics. Figure 26 shows the MVFU, and figure 27 shows locations of jumpers on the MVFU circuit board. Figure 28 shows the configuration of holes on a 2-channel tape.

Operating instructions for the MVFU are contained in the *Printer Operator's Manual*.

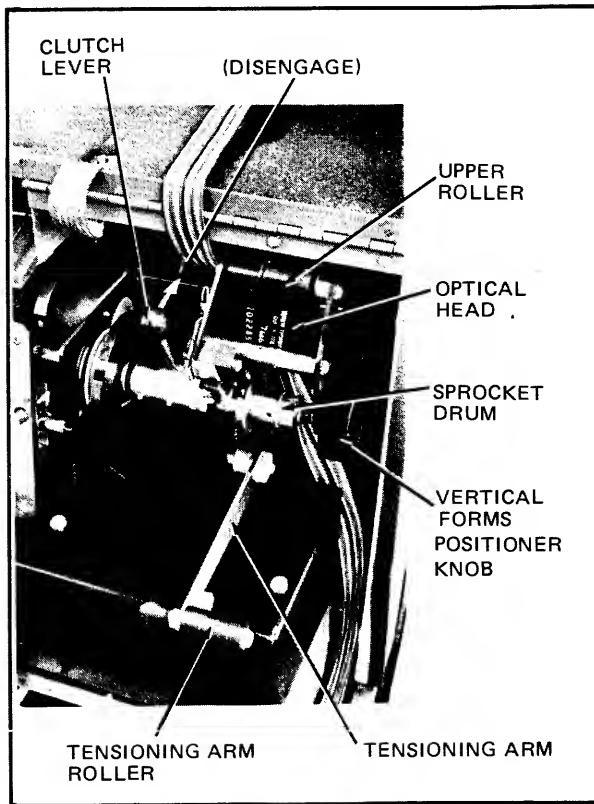


Figure 26. Mechanical VFU

LONG LINES INTERFACE

The Long Lines Interface permits operation of the printer at a considerable distance from the controller. The maximum parallel data rate for lines under 100 feet remains 500,000 kHz, with speed derated at 200 nanoseconds per 50 feet for longer lines. Strobe width must be at least 2 microseconds for lines longer than 500 feet.

This option includes a self-test feature which will produce an all-E's pattern on the printer.

The unit consists of a special Logic A PCBA containing differential drivers and receivers, plus logic for self-test operation.

Note that the Long Lines Interface will operate only in conjunction with a Dataproducts-compatible interface.

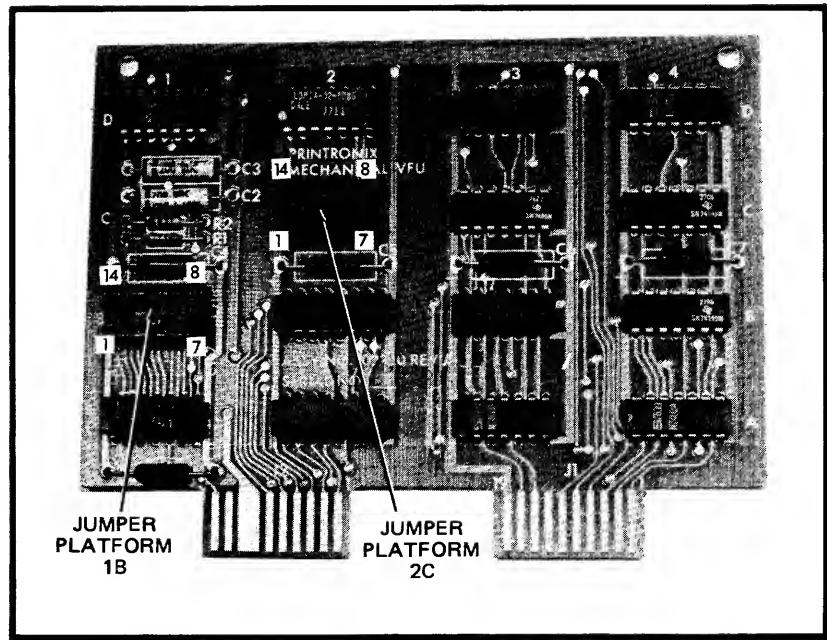


Figure 27. Jumpers on Mechanical VFU PCBA

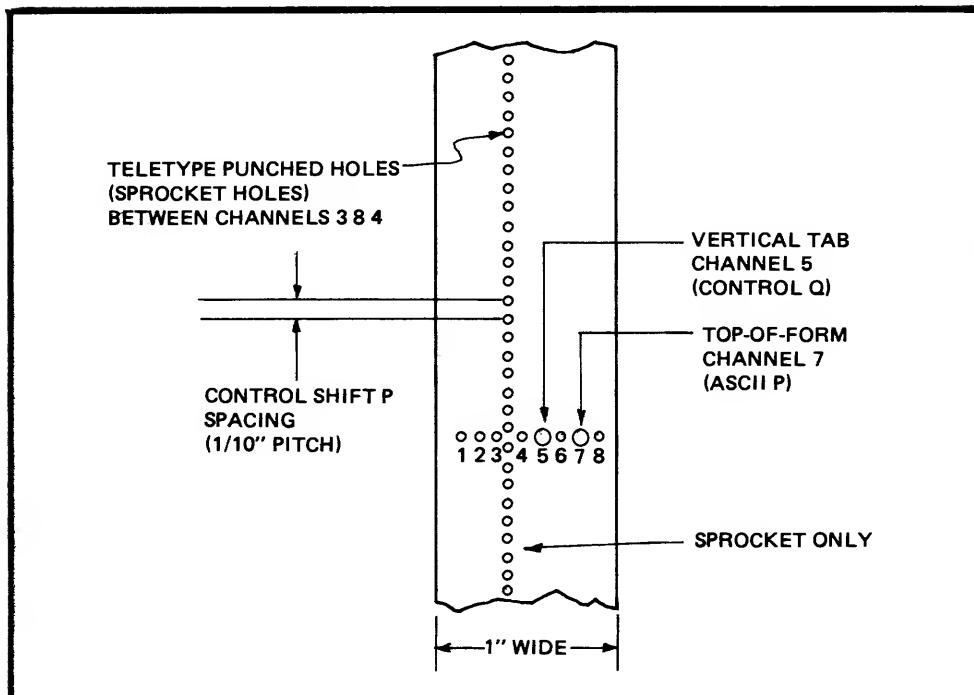


Figure 28. Tape Configuration for Two-Channel Mechanical VFU.

Table 6. Mechanical VFU Circuit Board Jumpers

Jumper Function	Location/Terminals	Comments
VB4 Enable	2C/1 to 14	Connect only for 12-channel operation. Omit for 2- or 8-channel operation.
Skip-over Perforation	2C/5 to 10	Connect to enable skip-over perforation function. Tape (and paper) will slew from BOF hole to next TOF hole to prevent printing on or near form perforations. Omit jumper to disable skip-over function.
Channel 1 through 8	2C/6 to 9	Connect only to generate a low-true BOF signal for each BOF hole read.
	2C/7 to 8	Connect only to generate a high-true BOF signal for each BOF hole read.
Channel 1 through 8	1B/1 through 1B/8	Each pin represents a corresponding VFU channel number 1 through 8. Jumper one pin to pin 14 to select TOF channel, and jumper another pin to pin 13 to select BOF (Vertical Tab) channel. (See Top of Form and Bottom of Form below.)
Top of Form	1B/14	Connect to selected TOF channel number. Usually channel 1 (1B/1) for 8-channel tape, always channel 7 (1B/7) for 2-channel tape.
Bottom of Form	1B/13	Connect to selected BOF channel number. Usually channel 8 (1B/8) for 8-channel tape, always channel 5 (1B/5 and 1B/4) for 2-channel tape.
		Note that both TOF and BOF must not be punched on the same line.

RS232 INTERFACE

The RS232 Interface receives serial data through either an EIA RS232C, or current-loop, link; and converts the data into parallel-bit words which are transferred into the Printer. Received data is stored in a first-in/first-out buffer which can accumulate up to 1024 characters. The buffer allows smooth and efficient transfer of data to the Printer, relatively independent of consistently received data input.

The RS232 Interface kit comprises a printed circuit board module which is installed in the spare slot in the Printer card cage, and two cables. One cable connects the module to a connector on the Logic A PCBA, and another connects the module to the RS232 connector on the rear of the Printer.

A 25-pin EIA connector is provided for connecting the Printer to the modem, terminal, or CPU (figure 29). For a current-loop interface, the 4-wire I/O cable is connected to a terminal strip on the rear of the Printer.

The Interface provides a switch-controlled self-test feature. In the self-test mode, the Interface causes the Printer to print a full-width all-characters pattern to verify correct operation.

Other particulars include:

Serial Data Rate Switch selectable, 150, 300, (Baud) 600, 1200, 2400, 4800, or 9600.

Parallel Data Rate . . 125,000 characters/second, max.

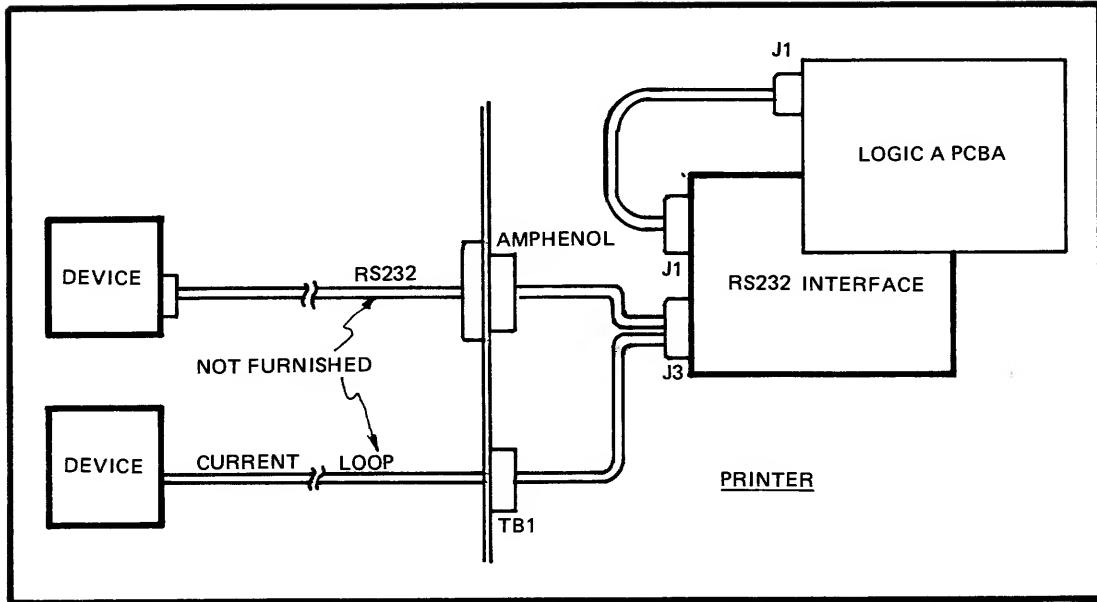


Figure 29. RS232 Interface Cabling

Serial Data Format . . . Start bit
 7 or 8 data bits (selectable)
 1 Stop bit
 Parity bit (selectable odd, even, or ignore)

Power Requirement . . . DC power supplied by Printer.

Logic Levels . . . Logic 1 = Mark = 0 to -25V
 Logic 0 = Space = +3V to +25V

Current Loop . . . 20-ma. Passive receive/active transmit

Connector information is given in table 7 for use in planning and pre-configuring the system for the RS232 Interface option.

Instructions for configuring and installing the RS232 Interface are included in the RS232 Interface kit.

BLOCK CHARACTER PRINTING

Large characters 0.4, 0.5, 0.6, or 0.7 inch high, or larger, may be printed using the Block Character Printing option. Large characters are often required for quantity printing of large labels, etc. This option provides very high printing rates — much faster than Plot Mode operation when data is received through a serial data interface such as RS232 or a current loop. Programming is also much simpler using Block Character Printing.

Table 7. RS232 Interface I/O Connector Terminations

P1 Pin No.	EIA RS232 Name	CCITT V-24 Name	Signal
1	AA	101	Protective ground
3	BB	104	Received serial data in
4	CA	105	Request to Send out
6	CC	107	Data Set Ready in
7	AB	102	Signal ground
8	CF	109	Carrier Detector in
11	—	—	Reverse Channel out
20	CD	108.2	Data Terminal Ready out
25	—	—	External clock in
TB1-1			Current loop data in +
TB1-2			Current loop data in -
TB1-3			Current loop data out +
TB1-4			Current loop data out -

The only hardware change required for this option is replacement of the standard Logic A PCBA (P/N 101685) with the special Logic A PCBA (P/N 102190) which accommodates full-width characters.

The PROMs define the shape of each block that forms the large characters (see figure 30). A repertoire of 64 block segments (including space, or blank) may be printed, in addition to 64 standard ASCII characters.

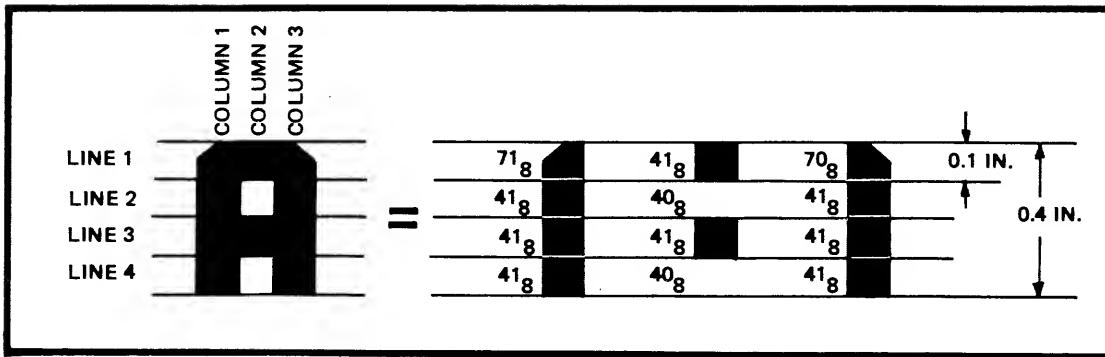


Figure 30. Typical Block Character Printing

This option excludes the lower-case character set, and is accessed as an extended-character set. Standard characters may be printed in any line containing block characters.

The Logic B PCBA (Model B4 and subsequent models) must be configured for 10-LPI operation.

Refer to *Application Note No. 102863* for a complete description of the Block Character Printing option.

The Printronix Mini-Exerciser is a simpler, low-cost device for testing Printer operation. The Mini-Exerciser is a printed circuit board assembly which plugs directly into the Printer interface connector, and causes the Printer to produce a repetitive, 132-column, all-characters pattern. The device has no operator's controls, and is intended primarily for performance verification.

The following information pertains to the full-size Printer Exerciser only.

PRINTER EXERCISER

INTRODUCTION

The Exerciser offers a convenient means of testing and verifying operation of the printer, and is a valuable tool in troubleshooting and maintaining the printer.

The Exerciser (figure 31) is a small unit comprising a printed circuit board, a control panel, and a cable which connects to the I/O interface connector of the printer. Power is supplied by the printer power supply and no other connection is required.

The unit permits printing a shift-recycle pattern either one line at a time, or repetitively. Certain characters may be repeated to check vertical and horizontal dot alignment, or to test the printer under worst-case conditions.

Virtually any printer function may be tested with the Exerciser — line spacing, elongated characters, Shift In/Out, Plot Mode, underline, form and line feed, carriage return, tab, and different EVFU functions.

PREPARING EXERCISER FOR OPERATION

a. With the cable disconnected from the Exerciser, set POLARITY switch as follows:

1. Set to + (pos) position for Centronics interface, or for Dataproducts interface in which jumper W7 on Logic A Board is omitted.
2. Set to -(neg) position for Dataproducts interface in which jumper W7 on Logic A Board is installed.

b. Connect cable connectors to printer interface connector, and to Exerciser connector (so that the cable exits upwards).

c. Turn on printer power. If the printer is loaded with paper and otherwise ready for operation, put the printer ON LINE.

EXERCISER CONTROLS

The following paragraphs list controls on the Exerciser, and describe their uses.

RUN-OFF-SINGLE LINE Switch

OFF — No printer operation.

RUN — Printer will run selected test for as long as switch is in the RUN position.

SINGLE LINE — Printer will run selected test through one line, and then stop.

LINE LENGTH Switch

Selects number of characters in each printed line,

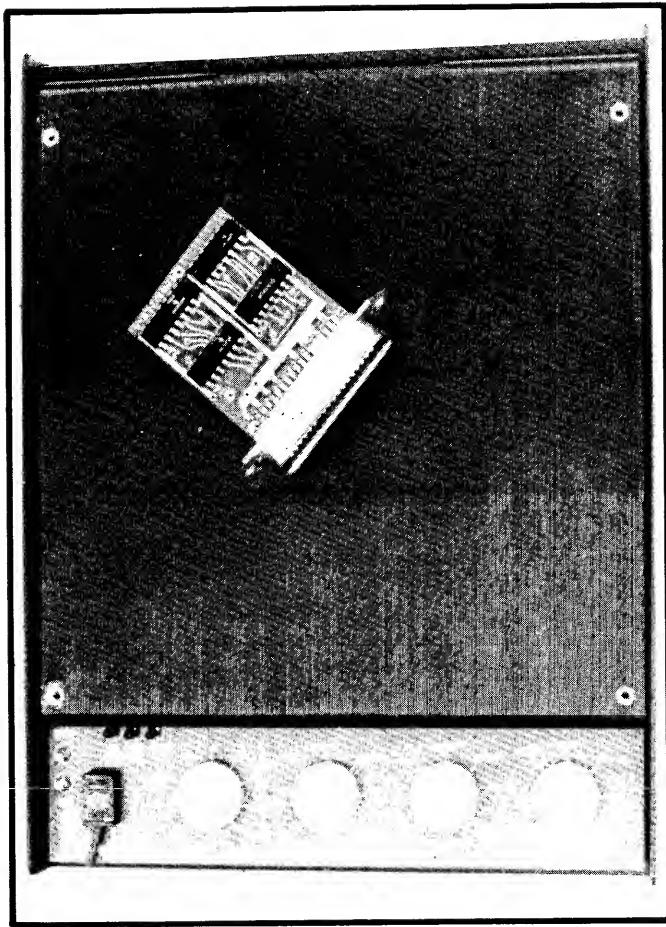


Figure 31. Printer Exerciser (with Mini-Exerciser)

from four characters to 132 characters, in nine steps. If printer is loaded with paper narrower than 14 $\frac{1}{8}$ inches, be sure this switch is set so that printing will not occur off the paper.

When this switch is in the 0 (zero) position, paper is stepped one character line every 33 msec, without printing.

CHARACTER Switch

This switch selects the character, or character pattern, to be printed.

SPACE (040_s) — Printer performs all printing functions, but does not actually print.

E (105_s) — Printer prints upper-case letter E to check vertical dot alignment.

H(110_s) — Printer prints upper-case letter H to check horizontal dot alignment and magnetic pickup phasing.

(043_s) — Printer prints symbol # to provide a worst-case condition (maximum number of dots printed).

DEL (177_s) — Although DEL is treated as SPACE in normal print mode, this character causes all dot positions to be printed in the Plot Mode. Used to check horizontal alignment of hammer tips.

SR 0-64 — Printer prints basic character set (040_s to 137_s) in a shift-recycle (sliding) pattern.

SR 0-96 — Printer prints character set 040_s to 177_s in a sliding pattern. If lower-case character set PROMs are not installed in the printer, spaces will be printed for those character codes.

SR 97-160 — Printer prints extended (optional) character set. Spaces will be printed for those codes if extended character set PROMs are not installed in the printer. Note that the extended character set is accessed by raising data line 8, and the I/O interface must be configured to respond to that signal. (Jumper W4 on Logic A PCBA must be omitted.)

SPECIAL Switch

This switch selects any of one of seven different printer operations, as follows:

None — No special operation.

8 LPI — Printer prints with line spacing of 8 LPI (6 LPI when SPECIAL switch is in any other position).

ELONG CHAR — Printer prints with expanded character height and line spacing of 3 LPI.

SO-SI — Printer prints alternate groups of standard characters, and characters from the extended character set. Tests Shift Out/Shift In functions. Program is:

- 8 ASCII characters/SO
- 16 special characters/SI
- 16 ASCII characters/SO
- 16 special characters/SI

PLOT MODE — Printer prints data as a row of dots instead of as a line of characters. Line Feed is interpreted as a single dot row advance.

UNDERLINE — Printer prints a line of underlined characters, followed by the action set by FUNCTION switch. Note that (1) FUNCTION switch must *not* be in the CARR RET position, and (2) jumper W3 on Logic A Board must be omitted. If W3 is installed, only spaces will be printed.

ROW INC — Printer prints a line of A's, then a line of B's, etc.

RECYCLE — Printer prints complete repertoire (ABCDEF...etc.) on every line (pattern does not slide).

FUNCTION Switch

LINE FEED — Printer prints with 6-LPI spacing.

FORM FEED — Printer prints a line and then slews to next Top of Form to test top-of-form function.

CARR RET — Printer stores, but does not print, data terminated by CARR RET (015_s). *Will* print if either jumper W1 or W2 is installed on Logic A PCBA.

VERT TAB — Channel 12 of the EVFU is requested following data terminated by VERT TAB (013_s).

BIN CNT — Printer skips between lines of print in sequence from one line through 15 lines (only if jumper W5 on Logic A PCBA is *omitted*).

LOAD VFU — Permits EVFU to be loaded by the Exerciser. LINE LENGTH switch is used to specify length of form (number of lines), and CHARACTER switch *must* be in SR 0-64 position. Exerciser will assign channels as follows (jumper W5 on Logic A PCBA must be *omitted*):

Line	Channel
1	16
2	16
3	1
4	16
5	16
6	2
7	16
8	16
9	3
10	16
11	16
12	4
13	16
14	16
.	.
.	.
.	.
45	15
46	16
47	16
48	16
49	16
50	16
51	

Line	Channel
1	16
2	16
3	1
4	16
5	16
6	2
7	16
8	16
9	3
10	16
11	16
12	4
13	16
14	16
.	.
.	.
.	.
45	15
46	16
47	16
48	16
49	16
50	16
51	

VFU — terminates data transfer with request for Channel 1, Channel 2, etc. (see LOAD VFU above). Printing occurs on every third line.

VFU-16 — Terminates data transfer with request for Channel 16 (see LOAD VFU). Printing occurs with every third line blank.

POLARITY Switch

This switch is accessible only when the cable is disconnected from the Exerciser. Set switch to "positive-true" position for Centronics interface, or for Dataproducts interface with jumper W7 on Logic A PCBA *omitted*.

Set to "negative-true" position for Dataproducts interface when jumper W7 is installed on Logic A PCBA.

PRINTRONIX

17421 DERIAN AVE., IRVINE, CALIFORNIA 92714
(714) 549-8272 TWX 910-595-2535